

THE PLOUGH

THE LOOM AND THE ANVIL.

FARMER AND MECHANIC.

F. G. SKINNER AND MYRON FINCH, EDITORS.

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The Plough, the Loom, and the Anvil.

EDITED BY F. G. SKINNER AND MYRON FINCH.

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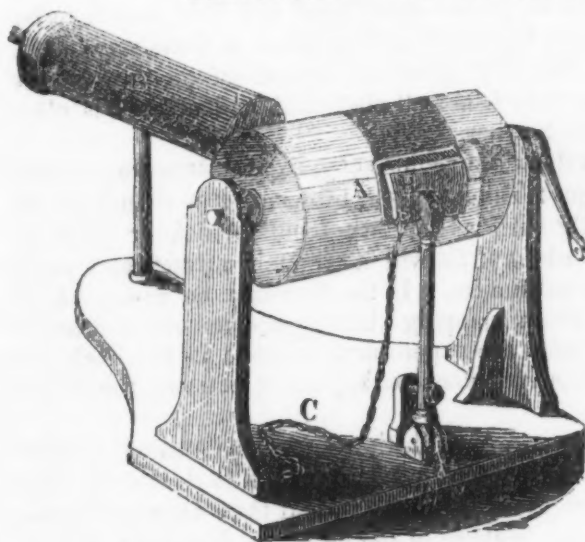
The Plough, the Loom, and the Anvil.

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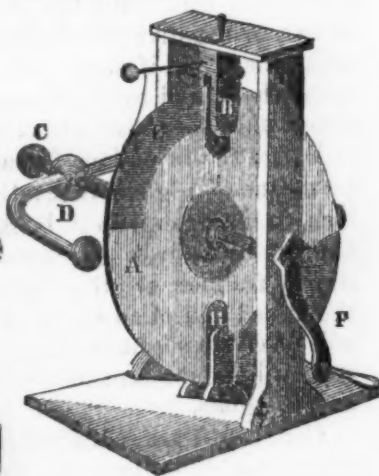
FEBRUARY, 1853.

No. 2.

ELECTRICITY AND ELECTRICAL MACHINES.



1.—THE CYLINDER MACHINE.



2.—PLATE ELECTRICAL MACHINE.

THE name of the science of Electricity is derived from the Greek word for amber, because the ancient Greek philosophers were the first who observed and recorded the electrical phenomena exhibited by amber when excited by friction. Thales of Miletus, who flourished about 600 years before the Christian era, is reported to have described these phenomena; but Theophrastus was probably the first writer who attempted to describe the attractive powers of bodies, distinct from the attraction of gravity and magnetism.

The knowledge which the ancient philosophers possessed respecting that branch of electrical science, now termed frictional electricity, was exceedingly limited; for, although it may have extended to many facts, it embraced few principles, and was totally devoid of that systematic arrangement which constitutes the basis and glory of modern science. Indeed, Electricity was not known as a *science* until the inductive philosophy had shed a flood of light on the human mind, and enabled it to explore the field of investigation which this department of knowledge opens to the delight and utility of mankind. This science, embracing Galvanism, Magnetism, and Thermo-Electricity, is curious on account of the phenomena which it enables us to explain; beautiful on account of the beauty of the experiments which illustrate it; and important on account of the manner in which it enables man to mock the dark cloud, defy its power, play with the lightnings of heaven, and manage with the greatest dexterity the most subtle agent in nature.

Bodies that can be excited to electricity are called *electrics*, and as they do

not convey electricity from one body to another, they are also called *non-conductors*; such as cannot be excited are termed *non-electrics*, and, as they are capable of conveying electricity from one body to another, they are called *conductors*. Of the former the principal are—glass, precious stones, amber, sulphur, resinous substances, wax, silk, cotton, hair, feathers, oils, &c.: of the latter, all metals, charcoal, animal fluids, water, crystallized salts, &c. When bodies possessing their proper quantity of the electric fluid come in contact, no effect is produced; but when two bodies, one possessing greater, and the other less than the proper quantity, approach near each other, a discharge takes place, and the equilibrium is restored. A body possessing more than its proper quantity of electricity, is said to be *plus*, or positively electrified; and a body containing less than its proper quantity of this fluid, is said to be *minus*, or negatively electrified. Bodies electrified either of these ways repel each other; but if some are electrified *plus*, and others *minus*, they attract each other: and again, if one body is not all electrified, and another is electrified *plus*, they also attract each other.

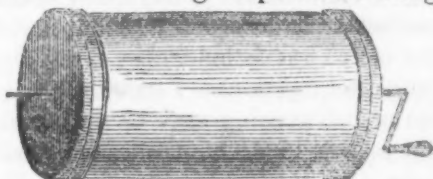
Before the invention of the electric machine some experiments were made by means of a glass tube; thus: Take a glass tube, not less than half an inch in diameter, rub it briskly with a dry silk handkerchief, or piece of flannel, backwards and forwards, and it will alternately attract and repel downy feathers, or other light substances. If the knuckle be presented to the closed end of an excited tube, a snapping will be perceived, and the finger will receive a slight shock; should the experiment be made in the dark, the snap will be accompanied with a luminous spark, passing between the finger and the glass.

Conductors are so called, because, though they cannot be excited to electricity, yet when brought near or in contact with an excited electric, they will receive from it a portion of the electric power, and thus become capable of exhibiting appearances similar to those of the electric. Thus, if a metallic rod, with one sharp end pointed towards an excited electric, and the other end a knob, the rounded end will attract light bodies and emit sparks. By these conductors, the electric fluid may be conveyed to any distance from the excited body; if a chain be attached by one end to an excited electric, and the other end be held by a person stationed miles distant, as in the telegraph, that person will experience a shock, and draw some electric sparks.

The same conductors in different states are good conductors, and non-conductors: thus green wood is a good conductor, while baked wood is an electric; charcoal is a conductor, but wood-ashes are an electric. When a body is placed in contact with an excited electric, it cannot be charged with electricity while it communicates with the earth by means of a conductor, as a table, &c.; to electrify it, therefore, it must be placed on a non-conductor, as a stool or table with glass legs, a cake of wax, resin, or the like. It is then said to be *insulated*. Bodies surcharged with similar degrees of electricity, when brought near, repel each other; while a body that is positively electrified, or surcharged with the fluid, will attract another body that is negatively electrified, or deprived of some of its electric fluid. The reason of this is, that the body which has more attracts the body which has less, in order to impart this superfluity, and thus restore an equilibrium, as in the thunder-clouds.

These and other wonderful properties of the electric fluid having been discovered, philosophers began to contrive machines, for the purpose of making more important experiments; and glass having been found most suitable to the purpose, was universally employed in their construction. From the day that Franklin bottled up the lightning, until Morse taught it to write a good hand, and Mr. House set it to printing, and others made it act as a

physician, various have been the modes of producing and retaining it. Our cut No. 1 represents a machine to *produce* a certain amount of electricity, and then to hold on to it as long as it may be wanted. It consists of a cylinder of glass, A, turning on an axis that passes through its centre. The electric fluid is generated by the friction of the cylinder against a cushion placed at R, whence it passes off into the conductor B, where it remains for a time. C represents the bottom board and the upright pieces for supporting the cylinder, which is in the following shape before being placed upon them :



JAR CYLINDER.

Cut 2 is another kind of electrical machine. A plate, A, is used instead of a cylinder, because both sides of it are exposed to the rubbing, and more electricity is produced. Both cushions, B B, are made double, and press tightly on the plate by means of screws. The conductor, D, is very slender, and has two arms projecting from it, and nearly touching the edge of the plate in two places.

The cushion or rubber, by which the cylinder is excited in its rapid rotation, is of black oiled silk, covered with an amalgam prepared as follows :

Take a certain quantity of zinc and place it over the fire in an iron ladle; when red hot put a small amount of tallow on the zinc, and it will instantly melt. When the zinc is melted, add four or five times as much mercury, previously heated to the degree of boiling water; stir the mixture; when cool, rub it in a mortar till the fat be incorporated; it is then fit for use.

The conductor to a cylindrical machine is usually a tube of copper, brass, tinned iron, or pasteboard covered with tin-foil or gold leaf. The end next the cylinder has a row of metallic points fixed for receiving the electric fluid. The leg on which it rests is of glass, covered with sealing wax. Such a machine is easily made, and in future articles will be shown how to perform practical experiments.

THE LOOM, AND ITS PROBABLE ORIGIN.

THE loom is one of the most venerable of machines. It cannot have its origin determined from history, nor at what time cloth began to be manufactured either from animal or vegetable fibre; but of this we are assured, that weaving has been practised in all ages and in all countries. In England, a manufactory of woollen cloths, we find, was established by the Romans at Winchester, soon after their invasion of Britain. About six centuries later, we find a curious allusion to the process of weaving, as practised by a bishop, who, in a treatise on "female purity," thus illustrates his subject: "It is not a web of one uniform color and texture, without any variety of figures, that pleaseth the eye and appeareth beautiful, but one that is woven by shuttles, filled with threads of purple and many other colors, flying from side to side, and forming a variety of figures and images in different compartments." This is a very accurate description, in part, of the process of figure weaving.

In the eleventh century the weaving of cloth had made a considerable degree of improvement, and the weavers in all the large towns in England were formed into guilds or corporations. The arts of spinning and weaving

silk in complete form were first brought to that country from France in the middle of the fifteenth century, and a company of females were established in London called "silk women," who exclusively managed the business. But the great improvement in this branch of manufacture may be traced to the religious persecutions in France and Flanders, when more than fifty thousand workmen of various descriptions took refuge in Britain. Shortly after the immigration of the Flemish manufacturers into England, we find an act passed prohibiting the wearing of cloths made in any other country; and in the time of Elizabeth, the manufacture had become so extensive, that the exportation of the raw materials for cloths was forbidden by law. By that policy, England became almost a self-subsistent nation. *Verbum sap.*

The principle of the art of weaving may be said to consist in crossing two sets of threads at right angles to each other; and it was probably first conducted in an extremely coarse and simple manner, like the interlacing or platting of rushes to form mats. An uninformed savage having effected thus much, would naturally be led to operate upon finer materials, which nature might present to his hands, and he would be able to weave them with nearly the same facility as he did the coarse matting. He might receive assistance from a fellow-laborer, in perhaps opening the threads of his warp with the end of a stick, or in thrusting the weft through its interstices; this would naturally suggest the use of sticks, for opening the alternate threads of the warp, and beating up the weft. The primeval weaver, for want of assistance, might fasten his warp ends, which may have been long stripes of the inner bark, to the stumps or boughs of trees. With his sticks he would then be able to operate with comparative rapidity and excellence; and as it could not escape his or the by-standers' notice, that the alternate threads of the warp, divided into two distinct sets, were alternately raised and depressed by the sticks, and that sometimes from accidental circumstances some of the threads of the warp were raised or depressed by a pull instead of a push, we may imagine some contrivance resembling the treddles of our present hand-loom was naturally resorted to. Such *may* have been the gradual steps to the contrivance of the loom—the weaver first poking, next sliding, then throwing the weft.

The early history of the loom being involved in total obscurity, we have collected these stray suggestions, not only as endeavoring to trace its probable origin, but at the same time explain the really simple process of which plain weaving consists. In India and many of the Eastern nations, weaving is even now carried on by this very process. The weaver performs his labor in the open air, choosing his station under trees, whose shade protects him from a scorching sun. Here extending the threads which compose the warp of his intended cloth lengthwise, between two bamboo rollers, which are fastened to the turf by wooden pins, he digs a hole in the earth large enough to contain his legs in a sitting posture; then suspending to the branch of a tree the cords which are intended to cause the reciprocal rising and depressing of the alternate threads of his warp, he fixes underneath, and connected with the cords, two loops, into which inserting the great toe of either foot, he is ready to commence operations. The shuttle with which he causes the cross threads or woof to interlace the warp, is in form like a knitting-needle, and being somewhat longer than the breadth of the warp, is made to perform the office of baton, by striking the threads of the woof close up to each other. With this rude apparatus, it was proved at the recent exhibition in the great World's Fair, held in London, that the patient Indian succeeds in weaving fabrics which for delicacy of texture cannot be surpassed by the most civilized weaver, aided by the most complicated machinery.

Whatever may have originated the loom, however surrounded its birth may have been with darkness, wonderful has been its growth since. Like a star, it has struggled through the path of night, and is now travelling on its pathway of splendor, prophesying a continued increase of lustre till it reaches the perfect day.

TO THE HON. R. M. T. HUNTER,

CHAIRMAN OF THE COMMITTEE ON FINANCE, OF THE SENATE.

(Letter Second.)

SIR,—We are importers of cloth and of iron, of silks and of hardware; and, therefore, prices are higher with us than in the markets to which we find ourselves compelled to resort to make our purchases.

We are sellers of food and of cotton, and therefore prices are lower with us than they are in the markets to which we are forced to resort for the purpose of making our sales.

The more we go abroad to purchase cloth or iron, the greater is the *competition for purchase* in foreign markets, and the greater is the tendency to a *rise of prices*.

The more we go abroad to sell food or cotton, the greater is the *competition for sale* in foreign markets, and the greater the tendency to a *fall of prices*.

We desire to have cloth and iron more cheaply, and to obtain better prices for our food and cotton; and if these things can be accomplished, our farmers and planters will grow rich, and our labourers will not only be better fed and clothed, but will also accumulate capital and eventually become themselves employers. How can they be accomplished? This is the great question of our day, and its high importance will I trust be regarded as a sufficient excuse for asking your attention to the views now to be submitted for your perusal.

With a view to the attainment of these ends, various systems of policy have been suggested, all of which may be regarded as being now under consideration. They are—FIRST, the total abolition of custom-houses and the establishment of direct taxation.

We now consume about 900,000 tons of iron, half of which, and perhaps a little more, is made at home. How the necessity for going abroad to purchase the other half has acted on prices abroad you have already seen. Abolish the now existing duty and we shall have a repetition of the operations of the past five years, all the weaker of the still existing furnaces being crushed, until at length the domestic production will fall to probably half of what it now is, even if not much lower. The market will then be monopolized by a few very wealthy ironmasters at home and abroad; and should we still continue to use the same quantity, we would be compelled to go abroad for nearly the whole, and to purchase it at such prices as would cause it to absorb almost half of the whole proceeds of the cotton crop of ten Southern States with six millions of inhabitants. The consumption would, however, greatly diminish, as it has already diminished under the tariff of 1846, after having trebled under that of 1842.

Such, too, would be the course of things in relation to other commodities. It is quite true that we now supply ourselves with coarse cottons, and that a consequence of the vast domestic demand has been that we have been enabled to become large exporters of them. Abolish the duty, however, and our markets would be filled with poorer cloths, made of cotton and flour, whose

appearance would insure a market, and the result would be to close most of the cotton-mills of the Union. Thenceforward we should be compelled to look abroad for nearly our whole supplies, and the owners of the machinery of Manchester would then be enabled to dictate prices, and thus compensate themselves for the losses they might have incurred. To supply the place of two-thirds of the quantity now made at home would require 400,000 bales, and these, at only \$100 a bale, would be forty millions of dollars. Prices abroad, however, would rise as our competition passed away, and our total imports of cotton goods would require to be not less than seventy millions of dollars. The same effect would be produced on the woollen-mills, but very few of which would be running in six months from the date of the law. We now consume perhaps 70 millions of pounds of wool, the value of which in the form of cloth is about a dollar per pound, making 70 millions of dollars, and even if the foreign manufacturer continued to supply it as cheaply as now, we should require a total import of more than eighty millions of dollars: and thus we have in these three items two hundred and fifty, if not three hundred millions of dollars. To these must be added thousands of other commodities, the domestic manufacture of which would disappear under the new system, and which added to those already named, would amount to at least four hundred millions of dollars.

The people who go abroad to purchase must, as I have said, pay high prices, because they must pay the cost of importation. The more they must draw from abroad the higher must be foreign prices, and the higher must be freights, and the heavier must be the charges of the various persons who perform the work of exchange. Such being the case, it would scarcely seem as if we could safely seek for cheap cloth or cheap iron in the direction leading to the almost total abolition of the domestic manufacture of those commodities, with large increase in *competition for purchase* in foreign markets.

Neither does it appear that it is in this direction we should seek better prices for food or cotton. The smaller the number of people who manufacture cloth or iron, the larger must be the number who produce food, and the greater must be the necessity for resorting to foreign markets in search of customers—and every increase in the *competition for sale* in foreign markets tends to the diminution of prices. Cheap food and cheap cotton would have to pay for high-priced iron and cloth, and it scarcely needs to be said that such a state of things would be accompanied by a great diminution in our consumption.

Under this system we should certainly have cloth and iron dearer than now, while food and cotton would be cheaper than now, the consequence of which would be that it would become more difficult to obtain clothing, ploughs, harrows, or steam-engines. That not being the object sought to be accomplished, we may now look to THE SECOND PLAN—that which looks to so arranging the collection of the revenue as to maintain competition between the domestic and foreign producers of manufactured commodities, and thus rendering it *necessary* to look abroad for a portion of our ordinary supply. Before considering the mode adopted for carrying out this system of policy, I would beg you to remark, that however small the quantity that *must* be brought from abroad, the cost of obtaining that small quantity regulates the price of the whole, as was shown so clearly during the railroad excitement in England, when the high cost of obtaining the small quantity of 80,000 tons fixed the price of the whole 850,000 tons made at home. Under this system, the prices of all *must* be dependent upon foreign movements, over which we

have no control whatsoever, and thus must we be deprived of all power of self-government in regard to the very important matter of the prices at which to buy, or to sell, the commodities required by the farmer or planter in exchange for their products. Such must necessarily be the case even under low specific duties, but the effect is greatly aggravated under *ad valorem*s, which constitute a sort of *sliding scale*, tending, however, to produce an effect directly the opposite of that which so long governed the British trade in corn. Under that system, duties rose as prices fell, and their tendency was therefore toward the production of uniformity of prices. Under our system, duties fall as prices fall, and thus add largely to the variation in foreign prices, as will here be seen :

	Foreign cost of Railroad Iron.	Duty.	Total.
1846.....	\$58.00	\$17.40	\$75.40
1850.....	23.80	7.14	30.94
1852.....	40.00	12.00	52.00
1853, probably.....	50.00	15.00	65.00

We desire to have cheaper iron and higher prices for food, and to accomplish this we occasionally seek to produce competition for the sale of the former and for the purchase of the latter. So soon, however, as competition is produced duties fall, and they continue to fall precisely as prices fall, and in a few years competition is at an end, and duties then rise as prices rise. *The foreign producer and the government then unite to tax the consumer*, and thus is iron made so dear that consumption diminishes. It is scarcely in this direction that cheap iron must, as I think, be sought.

In 1846, under a duty of three cents per pound on lead, which secured to our own miners the domestic market, we exported no less than sixteen millions of pounds, at an average price but little exceeding the duty imposed on that produced in foreign countries. The tariff of 1846, however, reduced the duty to twenty per cent., and the result is, as has been shown, that the quantity now received at New Orleans has fallen to 260,000 pigs, and that we imported in 1850-51 no less than forty-three millions of pounds, at an invoice cost as high as the price at which we exported it but five years previously. From being sellers, and from having our own supplies at low prices, we have become buyers, and pay high prices—and it would scarcely seem to be in this direction that we should look for cheap lead. While we were sellers of lead it was used for ballasting ships carrying cotton to various parts of the world, and this tended to the reduction of freights. The same ships must now pay for stone-ballast, and freights must be high enough to enable them so to do.

The *extra* price paid this year by the consumers of this commodity cannot be set down at less than a million of dollars, and *this tax* for the maintenance of the owners of foreign and domestic lead-mines is more in amount than the capital that would be needed for carrying up our production to a hundred millions of pounds, and for producing it so cheaply that we could sell it to all the world.

Such, too, is the case with iron, the price of which, pig and bar, throughout the next twelve months, will range at least ten dollars higher than it would do were we now making only the same quantity that we made six years since. Taking the consumption at 900,000 tons, this will give a tax *in a single year* for the benefit of foreigners and of a few of our own people, of *no less than nine millions of dollars*, sufficient to build furnaces capable of yielding half a million of tons, or rolling-mills capable of turning out hundreds of

thousands of tons of railroad bars, each and every one of which would tend toward bringing about the result of making us sellers of iron instead of continuing purchasers of it.

The facts now occurring in regard to hemp are highly instructive. In 1841-42 the whole quantity that reached tide-water on the Mississippi was only 1,211 bales. Thenceforward it grew as follows:—

1842-43.....	14,873 bales.
1843-44.....	38,062
1844-45.....	46,274
1845-46.....	30,890
1846-47.....	60,238

The last three years are here given:—

1849-50.....	34,792
1850-51.....	25,116
1851-52.....	17,149

This change not having resulted from any increase in the manufacture of bale-rope or bagging, the average number of packages of those articles received in New Orleans in the past two years having been almost precisely the same as in the last two years of the tariff of 1842, it can be attributed only to diminution of the cultivation.

With this diminution there has been increased competition for the purchase of hemp in foreign markets, accompanied, of course, by a rise of foreign prices, as is here shown:—

	Import of hemp.	Price.		Untarred cordage.	Price.
1844-45.....	14,152 cwts.....	\$5.58	.....	Duty prohibitory.	
1845-46.....	27,831	5.86	.....	do.	
	Average.....	5.72			
1848-49.....	31,248 cwts.....	6.10	.....	13,300 cwts.....	\$7.31
1849-50.....	34,405	7.55	.....	11,831	7.25
1850-51.....	13,328	6.00	.....	23,175	6.88
1851-52.....	25,021	6.08	.....	14,491	7.80
	Average.....	6.43			

We see here that the foreign price of unmanufactured hemp has averaged nearly fifteen dollars per ton more than it did under the tariff of 1842, and that the foreign producer has thus put into his own pocket more than the reduction of duty. How this has operated upon the consumer will be seen on an examination of the following statement of selling prices in New York in the last nine years:—

	Hemp.		Cordage.	
Jan. 1844.....	\$185 to 190 per ton.	duty	11½ to 12 per lb.	duty
" 1845.....	180 " "	\$40	11½ to 12 " "	\$100
" 1846.....	180 to 190 " "	per ton.	11½ to 12 " "	per ton.
" 1847.....	220 to 225 " "		11½ to 12 " "	
" 1848.....	225 to 235 " "		11½ to 12½ " "	
" 1849.....	200 " "	30 per	11 to 12 " "	20 per
" 1850.....	200 " "	cent.	9½ to 10 " "	cent.
" 1851.....	215 to 220 " "		10 to 10½ " "	
" 1852.....	200 to 205 " "		10 to 10½ " "	

Cordage, as is here seen, pays 20 per cent., while hemp pays 30 per cent., and thus is a bounty offered for the substitution of the serf labour of Russia for that of our own people, the natural effect of which is a rise in the foreign price

of the raw product of the earth. The result of all this to the whole body of consumers would seem to have been nearly as follows:—

Increase of price on 25,000 tons of hemp.....	\$500,000
Diminution in the cost of 14,000 tons of cordage.....	350,000
Net annual loss.....	\$150,000

The consumers of hemp would scarcely seem to have been benefited by the system which looks to *compelling* us to depend on two markets, the near and the distant one.

Were it possible to place ourselves in the position of being sellers, instead of buyers of iron, lead, and hemp, we should be quite sure of having those commodities supplied for our own consumption more cheaply than is done in other nations. Such is the object sought to be obtained by the THIRD SYSTEM, that of efficient protection, and that it has been obtained is proved by the great fall in prices of almost all commodities that have been so protected as to enable our own people to acquire the complete supply of the domestic market.

Of all commodities, there are few in reference to which that has been so completely shown as in that of cut nails. Foreign competition has never existed, because such nails have not been made in Europe, and yet, while we are still large purchasers of railroad bars and other commodities of iron in which the policy of the nation has looked to the maintenance of foreign competition, we are large sellers of nails, in which the market has always been effectually secured to the homemade article—and I need not tell you, that when a people can export a commodity their own wants must be more cheaply supplied than when they have to import it. We export large quantities of coarse cotton goods, and thus afford conclusive proof that efficient protection has enabled the people who make those goods to supply the domestic consumers at lower prices than those at which they could be supplied from abroad, even were there no duty whatsoever. It must be remembered, too, that the low prices abroad are a consequence of our competition with foreign nations, not only in our own markets, but in those of South America, India, and other countries, heretofore held by them as their own exclusively. The more we can promote competition the more cheaply will be supplied not only our own farmers, planters, and labourers, but those of other countries, and we know well that the more cheaply cloth can be sold the more it will be worn, to the great advantage of the planters who produce the raw material of which it is composed. The increase in the foreign consumption of cotton cloth, now going on, is largely due to the fact that our competition with Great Britain has greatly reduced the prices in all the markets of the world, our own included. The truth of all this was fully admitted by Mr. Walker, when, in his report of 1848, he assured Congress that the effect of high duties was to stimulate manufactures, and, as he apprehended, *so far to lower prices as ultimately to prove injurious to the manufacturers themselves*, to the great advantage, however, as he did not add, of the consumer of the articles protected. That gentleman, however, was not aware that a large market enabled the manufacturer to obtain good machinery and to produce cheaply, and that the more cheaply he could supply the demand the more rapidly would the market increase, with constantly increasing facilities for obtaining new and better machinery. The protection afforded by the tariff of 1842 enabled the makers of iron greatly to improve their machinery, and they could now command the whole domestic market at a very moderate duty upon the average prices of the last ten years; and a few years more would enable them not

only to dispense with duty altogether, but ultimately to become exporters, and of course to supply the domestic consumption at less than the price at which it could be supplied from abroad, even without duty—and this without making any allowance for the effect of our production upon foreign prices. That effect is never taken into consideration by the gentlemen of the party which advocates the system called free trade; and yet, were they to give to the subject the consideration which it merits, they could not fail to see how enormous must be its effect. In my former letter I asked your attention to the great increase in the price of food that was produced in 1846–7 by the demand for Ireland, which yet did not absorb even two per cent. of our annual product. Such being the case, how great must have been the effect upon the price of cotton goods by an augmentation of our domestic manufacture from 260,000 to 500,000 bales, or from one-eighth to nearly a fourth of the whole crop—and upon iron, by an increase of our domestic production, from about 220,000 tons in 1842, to 850,000 in 1846! Here was an addition to the supply of the world equal to one-third of the whole product of Britain, and that in the short space of four years. At this time, specific duties not greater than the *ad valorem* ones of 1846, would at once carry up the product to a million of tons, and this would add to the present supply, in little more than a year, over one-fifth of the whole present product of England—enormous as that now appears—and in seven years from this date would carry it to two millions, even if it did not reach that point at an earlier period. The time would not then be far distant when our ships would be ballasted with iron going to foreign countries, as in 1845 and 1846 they were ballasted with lead, and I need not say that this would greatly benefit the producers of wheat and cotton. What the agriculturist needs is that we should cease to be buyers of iron or cloth, and become sellers of both, for then he would have both for his own consumption as cheaply as they are or can be supplied to any other nation of the world; and it is the object of effective protection to bring about this state of things.

Becoming sellers of those commodities, we should soon cease to be sellers of food, and it might be that we would soon become buyers of it, making a market for all the products of Canada; and it is unnecessary to say to you that the price of food must be higher in a country that goes abroad to *purchase* a part of its supplies, than in one which has to go abroad to seek a market in which to *sell* a part, however small, of its products. To what an enormous extent this would operate to the advantage of our farmers I propose now to show.

Our total export of farm produce to all the manufacturing countries of the world is about ten millions of dollars, and nearly the whole of this goes to Great Britain; and the price obtained for this small quantity—not one per cent. of the whole—fixes the price of the whole crop. It is boasted that “*Mark-lane* governs the world’s prices;” and such being the fact, it would appear desirable that the prices of *Mark-lane* should be high. The direct effect of sending to that market even the small quantity that now goes there is, however, to lower the prices of all the farm produce of England, and we know from experience how very great is the effect produced by a very small excess of supply. It is safe, as I think, to say that British prices are ten per cent. lower than they would be were we withdrawn from that market, and that all the food producers of the world would obtain prices that would be to that extent better were we to cease to maintain competition with them. Admitting now, that our farm produce amounts to no more than one thousand mil-

lions, then ten per cent. would amount to a hundred millions of dollars, and this is, as I think, a small estimate of the loss to our farmers from crowding upon the British market the food we send to it—and a very small estimate of the benefit that would result from placing ourselves in a situation to make our exports in the form of cloth and iron, instead of making them in the form of wheat or flour. Suppose, however, that we go one step farther, and make a market for the products of Canada, which thenceforth would also cease to press upon the market of England. Is it not clear that this would tend to raise still further the prices of that market, and, as a matter of course, those of Canada, and that thenceforth we should have to pay Canada those increased prices, adding thereto the cost of transportation? To me it seems quite certain that such would be the case, and that our prices would certainly thereafter be fixed by the cost of *buying* a small proportion of our consumption in higher markets than now exist, whereas now they are fixed by that at which we can *sell* a small quantity in distant markets borne down by our own food, burdened as the latter is with heavy cost of transportation to those markets.

Can such a market be made? For an answer to this question I would beg to refer you to the enormous extent to which the domestic market increased between 1840 and 1847, the production of which years has been thus estimated:—

	Wheat.	Barley.	Rye.	Oats.	Buckwheat.	Indian Corn.	Total.
1840*.....	84,823,000	4,161,000	18,645,000	123,071,000	7,291,000	377,531,000	615,522,000
1847†.....	114,245,000	5,649,000	29,222,000	167,867,000	11,673,000	539,350,000	867,826,000
Increase..	29,422,000	1,488,000	10,577,000	44,797,000	4,382,000	161,819,000	252,304,000

Here is an increase in seven years of no less than *forty per cent.*, and yet, notwithstanding a large increase of foreign prices, we had little more to export at the one period than at the other, as you will see by reference to the table given at page 10 of my former letter. The amount of export increased, it is true, seventy per cent., but the total quantity exported was entirely insignificant when compared with the total production, as you may readily satisfy yourself. As yet, however, the change had only just begun. In 1842 we were in a state of ruin, and it was not until 1844 that the tariff of 1842 began to be felt—and it lasted only two years more. Had it been allowed to continue in existence, we should be now working up a million of bales of cotton, and a hundred millions of pounds of wool, and mining eight or ten millions of tons of coal, much of it to be employed in making 1,500,000 tons of iron—and for all these things the market would be growing as fast as the supply, because of the superior condition of the farmers and planters, the mechanics and labourers, consumers of food, fuel, and iron. That improvement would be due to the double operation of *diminishing the competition* for the sale of raw products of the earth, and *increasing the competition* for the sale of manufactured articles. The people who made all this cloth and iron, and those who mined all this coal, would be now consumers of food, and not producers of it, and this alone would make a difference between the proportions of supply and demand—admitting agricultural returns to labour to remain the same—ten times greater than is made by all demands upon us for food by all the manufacturing countries of the world; and it would be quite safe to say that the effect resulting to our farmers from thus making a market for our own food and that of Canada would be equal to one-fourth of the whole of its present value, or at least two hundred and fifty millions of dollars.

* By Census.

† By Patent Office Report.

Add thereto the advantage that would result from being supplied with cloth and iron so cheaply that we could become exporters of them, and then determine for yourself if it is not the farmer who should pray for a system of efficient protection.

It may be asked, "How would this affect the planters?" It is well known that farmers buy largely of clothing when they obtain good prices for their products, and that they are forced to be very economical when prices are low; and in illustration of this we have the fact that our total consumption of cotton almost doubled under the tariff of 1842, in the short space of five years. The abstraction of our food from the market of Britain would have an important effect on prices throughout Europe, and this would enable the great agricultural countries which now supply England to obtain larger returns, *and of course to consume more cotton.* Canada and ourselves would have better prices for food, and the labourer would be better paid, and all would be larger consumers of clothing, to the great advantage of all who raised either wool or cotton. Not only must prices be better, but there would be a greater variety in our cultivation—green crops, of which the returns would come by tons, taking the place of white ones, the returns to which are made in bushels. Greater variety of productions would secure the farmer against the ruinous effects often produced by excessive rain or drought, when all his hopes are forced to rest on the single crop required for the distant market. Large crops would yield more manure, and their consumption at home would enable him to return that manure back upon the land; and his land would increase in value, while his income would be rapidly augmenting, enabling him further to improve his mode of cultivation, with vast advantage to himself and to the country at large. Viewing all these things, I think it quite safe to say, that the loss to the country from failing to follow out the doctrine of ADAM SMITH, who held that the natural place for the artisan was by the side of the producer of the food he was to eat and the wool he was to convert into cloth, is so great that were Great Britain to give us, *free of all charge*, all the commodities she sells to all the world, it would be as nothing compared with the loss to our farmers and planters from the separation of the producer and the consumer, resulting from the desire of that country to compel all the nations of the world to remain exclusively agricultural, leaving to her to be "the workshop of the world!"

The work of cultivation requires *physical* power. That of converting the products of the earth into the forms required to fit them for use requires but little physical power, but considerable intellectual power. The strong man raises the cotton, but the weak woman tends the spindle and the loom. The man digs the ore, but the child may tend the machine which converts the metal into pins or screws. Examine it where we may, we shall find that the work of conversion is performed chiefly by aid of labour-power that would be useless and waste were the spindle and the loom separated from the plough and the harrow, and here we have another reason why the system which looks to our confining ourselves to agriculture is so destructive of the prosperity of the country. You have, in Virginia, an amount of female labour alone, now almost valueless, greater than would suffice, if properly employed, to purchase more iron, more cloth, and more silks than are consumed in the State. Add to this the loss from the fact that British prices of food regulate ours, and that we are constantly forcing those prices down—that which results from the necessity for cultivating white crops perpetually, and obtaining six or eight bushels of wheat, when you might have hundreds of bushels of turnips or

potatoes—that which results from the perpetual exhaustion of the land for want of the manure that is sent to distant markets in the food you raise—and the further want of that stimulus to physical and mental activity, which results from the increasing reward that is everywhere consequent upon obtaining machinery for enabling man to substitute the vast powers of water and of steam for the labour of the hands—add all these things together, as I say, and then look at your vast deposits of power in the form of coal, at your great water-powers, and at your bodies of iron ore waiting to be converted into the machinery for bringing them into use—and having done this I will ask you to determine for yourself if the total loss to *your State alone* is not greater than would be compensated by the free gift of half the exports of Britain to all the world. That it is so I assert unhesitatingly; and I feel persuaded that when you shall have examined carefully, you will agree with me.

A recent German agricultural writer of high authority, and an advocate of free trade, after furnishing a most minute examination into the cost of cultivation under different circumstances, estimates that land which would be worth, close to a town at which its products should be consumed, *an annual rent of \$29,808*, would be worth at a distance of four German, or about twelve English, miles only \$7,467; the whole of this enormous difference resulting from the fact that on the first could be cultivated a great variety of products which could not be raised on the second because of the cost of transportation, and that on the first large quantities of manure could be cheaply placed, whereas on the second the cost of transporting it would be fully equal to its value on the farm. Such being the effect of the distance of a dozen miles, how enormous must it not be in a case like that of Virginia, where at a distance of hundreds, and even thousands, of miles from market, nothing can be cultivated but those articles of which the earth yields the smallest quantity, and which, therefore, command a high price, and that quantity still further diminished by the fact, that of the manure yielded by them not a particle ever goes back upon the land. It may appear to you a large calculation, but I am persuaded that I should not have exceeded the amount of loss to your fellow-citizens, the farmers of Virginia, had I stated it *at far more than half the value of the exports of Britain to all the world*.

That loss is a consequence of the determination of Great Britain that none but herself shall do any thing but follow the plough. She desires that the women and children of the world shall be idle, while hers are employed; and that such may be the case, she has laboured to prevent the exportation of machinery that might be used to enable the weaker sex to call to their assistance the powerful aid of steam. She desires that they shall send to her all the raw products of the earth, that the manure yielded by them may be placed on her own soil, and in this manner she obtains a crop of manure estimated to be worth one hundred and four millions of pounds sterling, or *five hundred millions of dollars*. If the gain to her be so great, what must be the loss to those who furnish the crop? She desires that they may raise only those crops that will bear transportation to distant markets, those of which the earth yields by bushels, while she is enabled to cultivate those of which it yields by tons. She desires that people shall scatter themselves over the earth, and that thus they may find increasing difficulty in obtaining schools. She desires that mills, furnaces, and factories may exist nowhere in the world but on her own land, and thus does she provide for that habit of intercourse among her own people which tends to the promotion of intellectual activity, while forbidding it among the people of the rest of the world. A necessary

consequence of this has been the exhaustion and ruin of all the countries that have had with her what she calls free trade, as witness Ireland, the West Indies, Portugal, India, and Turkey—and as further witness the torpid state of Canada. This last has every physical advantage that we possess, and yet her consumption of iron, of cotton, or woollen cloth is not half as great per head as ours, and for the simple reason that she looks abroad for a market to sell all she raises, and therefore must sell *cheaply*—and abroad also for a market in which to purchase all she desires to consume—and therefore must buy *dearly*. She has no protection, and we have some, and in that will be found the true cause of the difference between the value of land and of man on the two sides of the line.

Protection, however, leads to monopoly. So say the advocates of the system which tends to compel us to sell abroad all we raise and to buy abroad all we desire to consume—and therefore to *selling cheaply* and *buying dearly*. If it does so, it is a sufficient reason for discarding it, and therefore we may with propriety examine how stand the facts in this regard. Perfect freedom of trade, according to the *British* system, looks to making the people of Manchester the masters of the cotton-grower, as under that system there would be scarcely a spinning-mill outside of England—and this would seem to be a monopoly of the most gigantic kind. That system would compel us to go abroad for all our cloth and all our iron—and here would be another gigantic monopoly—and between the two the farmers and planters of the world would become the mere hewers of wood and drawers of water to the men of Manchester and Birmingham. Perfect protection, on the contrary, looks to placing the loom and the spindle in the midst of the cotton-fields, enabling the planters to consume on the spot their own food and cotton, while employing labour that would otherwise be of little value: and that it has that effect is proved by the fact that the tariff of 1842 gave to Southern manufactures so great a stimulus that the consumption south of Virginia had reached 120,000 bales. Here, certainly, protection would seem to have been adverse to monopoly. Under the tariff of 1846 the factories south and west of New England have to a great extent been closed, and the Southern consumption has fallen to 75,000 bales, when it should have risen to 300,000; and thus the North has regained its monopoly under the system called free trade. So well is this understood, and so apprehensive of domestic competition are many of the large manufacturers of the East, that they now deprecate any addition to protection, as tending to *raise the price of cotton* and *lower the price of cloth*, neither of which do they desire to see accomplished. The present system gives them a monopoly of the Union, and they know that it would cease to exist were protection made effective and permanent. So is it with wool. Under the present system the large manufacturers of the East have a monopoly of the conversion of our own wool into cloths and carpets, and they deprecate efficient protection as tending to the erection of woollen factories in Virginia and Pennsylvania, Michigan and Wisconsin, the effect of which would be to raise the price of wool and lower the price of cloth. They have now the same control over the grower of wool that their neighbours have over the growers of cotton. So with iron. Under the tariff of 1842, Maine, New York, New Jersey, Ohio, and Tennessee contended with Pennsylvania. Under that of 1846, Eastern Pennsylvania has obtained almost a monopoly of the trade, and there are now ironmasters who deprecate further protection, because it will promote domestic competition and lower prices. Some of them would prefer to see railroad bars made free of duty, because that measure would

greatly raise the price of all iron in England, and enable them to add five dollars to their pigs, and ten dollars to their bars and blooms. The purchasers of stoves, and ploughs, and axes would thus be taxed for the benefit of monopolists at home and abroad. The present system establishes a monopoly in favour of the rich, and they fear that they would make less profit under a different one; and yet it would be difficult to find a case of more perfect ignorance of their own true interest. If the South make coarse cotton, and the West coarse woollens, it must be under a system that enables the East to make finer ones, of which the consumption would then be ten times greater than it is now; and if Virginia mines her own coal and makes her own iron, she will need twenty steam-engines where now she needs not even one, and thus all will prosper together.

Protection is everywhere leading to the abolition of monopolies. Twenty-five years since Germany exported nearly all her wool to England and imported cloth, and the British government taxed the wool that thus passed through its ports and factories, no less than 12 cents a pound. In 1835, Germany determined to make up her own wool, and with that view adopted *efficient* protection, the consequence of which is that she has become a buyer of wool and a seller of cloth, and her markets are supplied so cheaply that she exports cloths to all the world. To this competition *for the purchase of wool and for the sale of cloth* was due the abolition of the duty on wool by England, and its late reduction by France, where it is admitted that the measure has been forced on the government by the determination of the people of Germany, Spain, and other countries to convert their own food and wool into cloth, agreeably to the advice of Adam Smith. Prior to the tariff of 1828, every pound of cotton that we sent to England to be spun and woven, even for our own use, was taxed *a cent and a quarter* for permission to pass through British mills. That tariff reduced the duty one-half, and the *Zoll-Verein*, by protecting German cotton-manufactures, accomplished the abolition of the tax. All the free trade now so much talked of by England has been forced upon her by the determination of other nations to rid themselves of the taxation imposed upon them by her monopoly of machinery. Protection would therefore seem to be the true road to perfect freedom of trade.

The true policy of the farmer and planter is that which tends toward enabling us to become sellers of manufactured commodities and buyers of raw products of the earth; but the advocates of monopoly, at home and abroad, desire that we shall continue in our present position, because that insures *to them* cheap food and cotton, and high prices for cloth and iron. Understanding this, it will not be difficult for you to see why it is that the large Eastern manufacturers are now so anxious for reciprocity with Canada. It would give them new supplies of food while enabling them to sell to that country many manufactured articles that do not need protection; and thus their object is precisely the reverse of that of the farmers who deprecate the further cheapening of food, or the further rise in the price of cloth or iron.

In another letter I propose to lay before you some facts tending to show how rapidly the present system is tending to commercial and political centralization. Meantime I remain,

Very respectfully,

Your obedient servant,

HENRY C. CAREY.

Burlington, December 4, 1852.

THE REARING OF MULES FOR MARKET.

WE have always looked upon mules as a sort of interloper among the beasts which God made, which was unworthy of the attention of agriculturists. But a writer in the *Albany Cultivator* is of a different opinion, and seems to understand what he is about, and we propose to give him a hearing. He says:

It is not probably generally known, that the rearing of mules is one of the most profitable occupations engaged in by American farmers; and that the supply does not keep pace with the demand. The principal markets are those of the cotton and sugar growing States, and for the California and Oregon emigrants, who take the overland route. At the present time a three-year-old mule, standing thirteen hands high, and of good action, will readily bring \$100, and those standing fourteen hands high, and well broken to harness, and possessing good points, command from \$120 to \$130 each. The great endurance of the mule; their adaptedness for hot climates; the great age to which they attain; the ease and cheapness with which they are raised, and their hardy constitution, together with the high price obtained for them, and the increasing demand, all tend to make it a business worthy the attention of those engaged in pastoral life. But very little science appears to be employed in the propagation of this species of animal hybrid; and the best course to effect a change, would be for agricultural societies to award liberal premiums for the best formed, and largest, and most active specimens; and to encourage the importation of the largest sized and best made jacks from the south of Europe. To secure large and well made mules, the first consideration is to obtain the services of a large, active, and neatly made jack; and the next point of importance is to select the largest and most sprightly mares, and the progeny from such a description of stock would afford a race of mules that would command the highest prices, and for all kinds of labor in a hot dry climate, would be incomparably superior to horses for all kinds of severe drudgery, and especially for farm labor and roadsters. By careful crossings of this kind a popularity would thus be imparted to the mulish family, that in no other way can be obtained; and there is no good reason why mules averaging sixteen hands high, embodying a beautiful combination of the points of both races of animals, cannot be raised with as much certainty and success as attend the efforts put forth to improve the race of horses, or any of the domesticated animals. Good mares for the purpose are abundant in Pennsylvania, in parts of Tennessee, and in most of the Northern States; and the Spanish jack should be imported and made to take the place of the stunted and inferior race that are generally found in this country. This may at first sight appear a small matter, but the demand has become so urgent and universal for mules, throughout a very large portion of the Union, that to our minds, agricultural societies might, with great advantage to the interests of agriculture, hold out liberal encouragement for the improvement of this description of stock. The Board of Agriculture for the State of Ohio have, at both the annual State Fairs, awarded very liberal premiums to the owners of the best specimens of jacks and mules; and in the rearing of this stock, that State is now taking a very prominent stand, as well as in most other departments of agriculture.

The President of the Board of Agriculture, Michael L. Sullivan, Esq., who is the proprietor of a farm of some nine thousand acres of beautiful land, lying contiguous to the State capital, and alongside of the national road,

some seven miles in length, is the owner of several jacks, and his annual sales of mules range from three to four hundred, mostly three and four-year-olds. Many of his mules are broken to the plough and wagon, and the strongest and finest teams that are brought into the Columbus market are those of Mr. Sullivant, consisting of four well trained mules to each wagon.

The business of trading in mules is becoming a great favorite with many farmers in Ohio and Kentucky, and the day is not distant when this department of stock-rearing will be very extensively and profitably conducted throughout all the Northwestern States. The Upper Mississippi Valley, including the States of Illinois, Indiana, Wisconsin, Missouri and Iowa, hold out greater inducements for the propagation of mules than any other portion of the Union. The boundless and inexhaustible character of the pasturage of this interesting region; and having a direct water communication through the unrivalled Mississippi, to the Southern States, where the future demand will largely exist; together with the new and increasing demand that has been imparted by the tens of thousands of California and Oregon emigrants, that annually pass along the overland route, mostly making their outfits in those States, all tend to make that the most desirable location that could be selected for prosecuting extensively the business of propagating and rearing large and handsome mules.

The entire cost of rearing a three-year-old mule in Illinois or Iowa need not exceed thirty dollars, and the price obtained ranges from sixty to one hundred dollars, according to quality. No other stock are reared with so little expense and risk, and none affords so large a profit, with the prospect of a continued steady demand. To make the business as profitable to the farmers as it is susceptible, more pains are required on the part of those who undertake to select the jacks; and instead of employing small and badly shaped mares, the largest and finest should be selected for this purpose. Then, instead of allowing the young mules to become stunted the first winter, by a short allowance of provender, and even that of an inferior quality, as much pains should be taken in providing them with wholesome food as is given to the rearing of colts or calves. The young mule is very hardy, yet to secure a full and early development, he requires artificial food in winter and spring, as well as any of the young of the other descriptions of domesticated stock.

CISTERNs.

A WRITER in the *Granite Farmer* gives a description of his method of building cisterns. If durable, it is certainly economical. The plan may succeed well on certain soils. We are not informed of the nature of Mr. Closson's soil. What we published last month on "Pressure against Walls," should probably be taken into this account. But without further comment, we will let Mr. Closson speak for himself:

"If I were to construct a cistern for myself, I should do it in the following manner: In the first place, I should dig a hole in the ground about the form of a potash kettle, of sufficient dimensions to hold the required quantity. I should then put on three coats of cement—in all about one and a half inches thick; the first coat to be half the thickness of the whole, and to be made of two parts coarse sand to one of cement; the second coat to be of equal parts of sand and cement, and the third to be made of one part sand and two parts cement: each coat to be well brushed with a whitewash brush at the time of putting it on. I would then lay across one or more sticks of timber, accord-

ing to the size of the cistern, and cover with thick plank of some durable timber, and overlay the whole with some light material of sufficient thickness to keep out the frost, and the work is done.

I have a cistern built as above, which will contain over sixty hogsheads, the cost of which was less than twenty dollars.

Cisterns built in this way are not only cheaper, but are, I am fully convinced, more durable, and less likely to get out of repair than those of brick or wood.

The cement and sand should be well mixed before being wet, and a small quantity only wet at a time.

Yours truly, A. B. CLOSSON.

Hanover, December 8, 1852."

COATING AND ORNAMENTING ZINC.

THOSE who were present at the Fair in Castle Garden, will remember those very beautiful specimens of iron fire-places, imitating various styles of marbles. There were two different *styles* of this sort of work, both very beautiful, but each done by a process entirely unlike that pursued by the other. The one seemed to be a sort of varnish, the other an enamel. The one was almost wrought into the substance of the iron, the surface being painted, as we may call it for want of a better term, and then rubbed down to a perfectly smooth surface, as is done by carriage-builders upon the body of a coach, &c. The other process seemed to consist of the application of the material upon the surface of the iron, after the manner of plastering. And we believe the actual as well as the apparent difference between them is not very unaptly given in the same description.

A patent was secured in England, in December, 1851, for coating and ornamenting zinc, by means of acids, alone or combined with other matters, capable of acting chemically upon the surface. The solutions used may be applied by sprinkling, dabbing, marbling or spreading, and the surfaces coated are capable of further ornamentation by painting, which may be done with common oil colors.

The marbling process is thus described: "Lay over the clean surface of the zinc a piece of thin blotting-paper, or any kind of thin unsized paper, and then apply the preparation over the paper with a soft brush, or sponge, in such a manner that the liquid may soak through to the zinc beneath; or apply the preparation underneath the paper, directly upon the surface of the zinc. The latter method is generally to be preferred, when pigments are used for the purpose of producing a colored marbling. The gas formed by the action of the preparation upon the zinc will raise the paper into irregular bladders, and the paper should be left untouched upon the zinc till the action has ceased, which will generally be the case in two or three hours. It may then be lifted off, and the surfaces of the zinc underneath will have the appearance of veined marble.

The following mixtures are recommended by the patentee for producing the several colors specified:

1. For a light ash color: muriatic acid diluted with water to the strength of about 1.114.
2. For a yellowish gray color: chrome yellow, ground fine with soft water, and mixed with preparation 1 to a liquid consistency.
3. For an iron-gray color tinged with green: the pigment known as "mountain or Saxony green," mixed gradually with preparation 1 to a thin paste, and stirred till effervescence ceases.

4. For a gray coating: white lead, ground with soft water, and mixed with preparation 1. Kremnitz white may be used instead of the white lead.

5. For a yellowish white coating: flour of sulphur, ground fine with water, and mixed with preparation 1.

6. Indian ink color: butter of antimony, diluted with distilled water. This article may also be used with any of the foregoing preparations, *without affecting their color*, but producing a good ground for subsequent painting or other application.

7. A black color is also produced by butter of antimony mixed with spirits of turpentine.

All surfaces thus coated should have a covering of varnish, either of copal, or of mixtures containing wax.

STEARINE, SPERMACETI, SOAPS, &c.

If tallow or lard is digested with lime-water, and then the oil of vitriol be added, the mass will be decomposed; and upon the application of pressure the liquid portions will be expelled and stearic acid will be obtained. This is the substance of which stearic candles are made. It melts at 167 degrees of Fahrenheit.

These, and all other fats, consist of the same elements, and all very nearly in the same proportions. This appears from the following table:

Stearine,	-	-	-	-	-	-	-	-	C ¹⁴³	H ¹⁴¹	O ¹⁷
Spermaceti,	-	-	-	-	-	-	-	-	C ¹⁵⁰	H ¹⁵⁷	O ¹⁸
Margarine,	-	-	-	-	-	-	-	-	C ⁷⁴	H ⁷⁴	O ¹²
Butyrine,	-	-	-	-	-	-	-	-	C ⁶	H ⁶	O ⁷
Butter,	-	-	-	-	-	-	-	-	C ⁷	H ⁵	O ⁸
Caproin,	-	-	-	-	-	-	-	-	C ¹²	H ⁹	O ⁸
Capric acid,	-	-	-	-	-	-	-	-	C ¹⁸	H ¹⁴	O ⁸

The combination of these fats with potash or soda forms soaps. Soft soaps are made with potash and hard soaps with soda. The alkali decomposes the fat, while the oxygen of the atmosphere unites with these elements, forming an acid or acids, with which the alkali then unites and forms soap. Soap is, therefore, a salt.

BEESEX is composed of the same elements and with proportions (C³⁰, H³⁰, O²) similar to those of the fats, and it is not considered a vegetable production collected by these insects, but as a secretion.

A M E R I C A N I R O N .

It is a matter of national importance to all engaged in the iron trade, both in the manufacture and use of the article, to know the comparative value of the English and American manufactures.

The following from the *American Railroad Journal*—good authority on the subject—gives the decided preference to the American article:

The testimony of the celebrated metallurgist, Dr. Mushat, of Scotland, is decisive. He says that Scotch bars do not contain more than ninety per cent. of pure metal, whereas American iron contains ninety-nine per cent. But we have evidence on this score stronger than an opinion founded on chemical analysis. Late experiments at the Washington Navy Yard demonstrated

that English chain cable of a certain thickness of diameter was ruptured by a breaking strain of 716 pounds less than was required to rupture American chain cable of the same diameter.

During the experiments at the Washington Navy Yard, the strength of a chain of French manufacture was also tried. It yielded at a breaking strain of 1081 pounds, while an American chain of the same thickness only yielded at a strain of 1277 pounds. Similar results followed after over two hundred tests. With reference to Scotch and domestic iron, it is shown that the tenacity of the latter was more than double that of the former.

FOR THE PLOUGH, THE LOOM, AND THE ANVIL.

ANALYSIS OF THE COTTON PLANT AND SEED,

[WITH SUGGESTIONS AS TO MANURES.

BY THE LATE THOMAS J. SUMMER, ESQ.,
OF SOUTH CAROLINA.

Communicated by Dr. CHARLES M. WETHERILL, of Philadelphia.

IN a communication on the analysis of the ash of a cotton stalk by Mr. Judd, in the Proceedings of the American Association for the Advancement of Science, (p. 219,) a surprise is expressed at the absence of published analyses of the cotton plant, with the exception of one of the wool and another of the seed by Professor Shepherd. I owe it to the memory of my friend and class-mate in Giessen, the late Thomas J. Summer, Esq., to communicate the following analytical results arrived at by him while in the Giessen laboratory, and which, as far as I can learn, have not been published, except in pamphlet form for circulation among his friends.

ANALYSIS OF THE ASH OF THE COTTON PLANT.

The analysis was carried on in the usual manner: 6.181 grammes were digested with muriatic acid, and evaporated to dryness by the water bath. After moistening with acid, and adding water, the insoluble portion was separated, which consisted of 0.621 sand and coal, and 0.403 silica. The filtrate was divided into three equal parts: in the first, the iron in combination with phosphoric acid, lime and magnesia were determined; in the second, sulphuric and phosphoric acids; in the third, the alkalies.

	6.181 Grammes.	Percentage.
Potash,	1.365	22.08
Soda,	0.060	0.97
Lime,	1.082	17.50
Magnesia,	0.324	5.24
Oxide of iron,	0.444	7.18
Phosphoric acid,	0.849	13.73
Sulphuric acid,	0.081	1.31
Chloride of sodium,	0.037	0.59
Silica,	0.403	6.52
Carbonic acid,	1.066*	15.76
Sand and coal,	0.621	10.04
		<hr/> 100.92

* Ash gave 0.168.

ANALYSIS OF THE ASH OF COTTON SEED.

Preparation of the Ash.—The seed were burned in a muffle; only a slight red heat was necessary to burn them perfectly white.

For estimating the amount of water, 6.406 grammes of the seed were dried at 212° until no further loss of weight. The loss was $0.646 = 10$ per cent. water in the seed.

Estimation of the Ash.—6.587 of the dried seed left, by incineration in a platinum crucible, 0.237 ash = 3.6 per cent.

The qualitative analysis showed that all the constituents were present which were in the ash of the plant, with the exception of carbonic acid. The quantitative analysis was carried out similarly to the ash of the plant. The following are the results—1.882 grammes of the ash were used :

	Found	Percentage.
Potash, - - - - -	0.523	27.82
Soda, - - - - -	0.051	2.75
Lime, - - - - -	0.204	10.88
Magnesia, - - - - -	0.200	10.61
Oxide of iron, - - - - -	0.075	3.43
Phosphoric acid, - - - - -	0.667	35.43
Sulphuric acid, - - - - -	0.060	3.19
Silica a trace, }		4.84
Loss and chlorine, }		
Coal, - - - - -	0.020	1.05
		<hr/> 100.00

SUGGESTIVE REMARKS.

An inspection of the above analysis of the cotton seed shows that it abounds in the phosphates and alkalies. Drs. Will and Fresenius, in their analyses of the cereal grains, show that wheat also abounds largely in these constituents.

The following, their analyses of red and white wheat, will enable the comparison to be made:

	Red.	White.
Potash, - - - - -	20.80	30.17
Soda, - - - - -	15.01	
Lime, - - - - -	1.83	2.76
Magnesia, - - - - -	9.12	12.08
Peroxide iron, - - - - -	1.29	0.28
Phosphoric acid, - - - - -	46.91	43.89
Silica, - - - - -	0.15	
Coal and sand, - - - - -	4.89	9.03
	<hr/> 100.00	<hr/> 98.21

All these constituents being derived directly from the soil, plainly indicates the reasons why our lands in the South are so easily exhausted. The crops extensively cultivated here, all require in a great measure the same food from the soil; and hence, soils which will not produce cotton are alike incapable of producing the cereal crops. The great benefit derived from the application of cotton seed as a manure to these crops, is accounted for from

the same causes ; an abundance of phosphates being given in their application to the soil.

FALLOWING.

A system of tillage which carries away annually so large a proportion of these natural essentials to vegetation, and which provides no means of returning them, must necessarily impoverish any soil. A fixed principle in the agriculture of all countries, where the prosperity of the future has at all been regarded, has been the gradual but certain improvement of the soil. This is necessary for the support of increased population ; and in the slave States, where there has been such an extraordinary and rapid increase of the laboring population, it should never be lost sight of. The intensity of our southern sunshine prevents, in a great measure, the annual coat of grass which supplies vegetable matter to the soil in northern climates ; and the never-ending occupation of the soil by our system of culture prevents the natural improvement which in other countries is carried out by fallowing. I am well aware that fallowing is generally objected to in the South ; and where fallow is converted into pasture land, and taxed during the whole season for the production of herbage to sustain greedy herds, the system might well come into disrepute. Planters, too, object to fallowing, and say they have not land enough to allow one half to lie idle, &c. ; but reason and justice to the noble occupation of agriculture allow this objection to pass unheeded ; and its fallacy is proven by the desert wastes of "*old fields*," an agricultural feature] only common to the New World, and, we blush to say it, only visible in the Southern or planting States. In Europe, where arable soil, compared to population, is a thousand times scarcer than in the Southern States, the agriculturists find fallowing a remunerative system. It is but little understood in American agriculture, and we may be pardoned for giving the proper details for fallowing, believing it to be the *cheapest* manner of renovating our soils. A field intended for fallow should be deeply ploughed in mid-winter—the deeper the ploughing the better. This is simple preparation, but nevertheless necessary ; and above all things, keep every description of stock off the field. The porousness of the soil will facilitate the assimilation of the natural salts of the earth, and atmospheric action, with the dissolving influence of the rains, will generally bring to the aid of the succeeding crop a sufficient quantity of these for its production. Late in autumn the herbage should be turned under. This process exerts chemical and natural influence beneficial to the soil : first, as by decomposition of vegetable matter carbonic acid is produced, which is known to act as a powerful solvent of phosphated alkalies ; secondly, those portions of the grass and weeds not readily decomposable when admixed with the soil, give it that pliability so necessary to easy tillage, and thus aid the agriculturist in his future labors. A *bastard* system of fallowing might, by the aid of the black and red tory pea, be judiciously adopted in the cotton-growing States. Owing to their imperviousness to wet, they can be sown in mid-winter, and vegetating in the spring, without the aid of cultivation, generally make upon ordinarily productive land a sufficient crop to protect it from the sun in summer, and smother out those weeds which are such a pest to cultivated crops. The constituents of the Indian pea, known to be in a great measure derived from the atmosphere, would in all probability furnish a better green crop for subversion than the natural grasses and weeds. Judicious fallowing is therefore the cheapest, and by far the easiest mode of renovating and preserving

the productiveness of our soils, and if adopted and regularly persevered in, would heighten both the production and value of our cotton lands.

COMPOST MANURE.

Much may be effected in reclaiming worn-out cotton lands by a good system of compost manuring, the benefits of which have been forced upon our agriculturists by the gradual accumulation of animal manures, and the decomposition of wasted vegetable matter, in and around their barn-yards. It is a system which should be so generally understood and practised, that little need be said except respecting the increase of this manure and its application. It is a mistaken idea that the planter gains by hauling into his barn-yard the stalks from his corn and cotton fields, in order to convert them into compost manure. Their elements would be returned to the soil by the certain law of vegetable decomposition, if suffered to remain on the fields; and their place in the compost heap can be supplied easily by litter and leaves from the forests, grasses, weeds, and muck from the marshes, ditches, and fence rows on the farm. Weeds abounding in the alkalies furnish profitable vegetable matter for composting. In addition to these, we have the rotten wood and forest leaves every where so abundant. Muck or peat, being decayed vegetable matter in mass, in this concentrated form contains a large amount of phosphates and alkalies; and, when mingled with the droppings of animals, forms a compost highly retentive of substances thus imparted, which it yields most readily to the growing crops to which it is applied. Compost, when applied in winter, does not require to be thoroughly decomposed; but when, as in the case of crops where it is applied in the spring, and its elements are demanded immediately by the young plants, its decomposition should be perfect. The compost heap should be protected from the rains, in order to prevent those salts rendered soluble by moisture from being washed away. It would add much to the value of compost manure if the water collecting on the roofs of farm buildings was carried in gutters entirely beyond the yard, and not allowed to flow through it, which would be greatly facilitated by a concentration of farm buildings. Every domestic animal, if properly confined and quartered, when not in use or grazing, would amply repay the trouble of attending to them; and the filth from the wash-house, stercorary, pig-pen, hen-house, and pigeon-cote, so much neglected, would, if properly hoarded, furnish most valuable ingredients to the heap. A concentration of all that is essential to the production of our cultivated plants being found in the component parts of this fertilizer, derivable from the cereal food consumed by animals, and the phosphate and alkaline properties of the weeds, grasses, &c., makes it at once the best and cheapest form, at the command of our planters, of applying vegetable and animal manures for the immediate production of a crop. The quantity might be increased on every plantation in the State to a degree which would make its manufacture profitable. This, however, will never be done until fewer acres are planted, which will enable more land to be manured.

BONE MANURE.

Bones, according to Berzelius, contain fifty-five per cent. of the phosphates of lime and magnesia. The relative value of the bones of different animals varies, and their value is increased with the years of the animal. The bones upon every farm would furnish, if preserved and applied, a considerable amount of the best and most durable fertilizer, which is peculiarly adapted to the production of the cotton crop. This is proven by the identity of the constituents which compose bones and which are found in the cotton plant. The

planter in the marl regions, especially where fossil bones and shells abound, has an abundant supply of native phosphate of lime, which only requires pulverization to render it almost as useful as recent bones. Phosphates in the bones comprise their chief value, which is shown by the fact that they make a fertilizer equally as valuable after the fatty matter has been extracted by soap boilers as before; hence all old bones might be rendered valuable if properly applied. Guano, the most powerful fertilizer applicable to husbandry, is known to derive its great value from the amount of bone earth it contains. I therefore regard the annual waste of bones on plantations in the South, where more animal food is consumed than by any other people in the world, as the most suicidal disregard of that economy which has furnished the axiom to agriculturists that "*manure is wealth.*" Many arguments abound to favor the adoption of bones as manure amongst us. One is, they can easily be preserved, and it only requires the same labor to do this that it does to throw them away. Another argument in their favor is, that a laborer can transport in a sack, to a distant field, bone manure, which will furnish more constituents to the crop than can be concentrated in a four-house load of the best stable dung or compost manure; still another is the little labor requisite to apply them to the soil. The great secret of applying bones to the soil is found in pulverizing them into as finely separated particles as possible, which fits them for the operation of speedy atmospheric influence, that their constituents may be taken up rapidly by the plants. Grinding, crushing, and burning are the usual modes; but in order to fit the crushed bones or bone ashes for the greatest production, Liebig recommends to pour over the crushed bones or ashes half their weight of sulphuric acid diluted with four parts of water, and after they have been digested for twenty-four hours, to add one hundred parts of water; this mixture is sprinkled over the field immediately before ploughing. By its action, in a few seconds the free acids uniting with the bones contained in the earth, a neutral salt is formed, in a very fine state of division. Experiments instituted on soils for the purpose of ascertaining the action of manure prepared in this manner, have distinctly shown that neither grain nor kitchen garden plants suffer injurious effects in consequence, but that on the contrary they thrive with much more vigor after its application. (Liebig, Organic Chemistry, Am. Ed., p. 230.)

Another theory of application, by the celebrated Dumas, contained in his memoir "*On the manner in which Phosphate of Lime enters Organized Beings,*" (Comptes Rendues, Nov. 30, 1846, p. 1018,) is interesting. He remarks, that the phosphate of lime, being insoluble in water, nevertheless penetrates and is deposited in their structure, and bones containing it are slowly disaggregated by the soil, and disappear after a time under the influence of the rains. The investigations of M. Dumas discovered two causes producing these effects—the one acting rarely and feebly, the other constantly and with great intensity. The first resides in a property of sal ammoniac, which facilitates the solution of phosphate of lime. Though this salt dissolves a notable quantity, and exists in all running water, its small proportion renders its action in this respect inconsiderable. The second is found in the action of carbonic acid, and in this the true solvent of phosphate of lime is to be found; for water, impregnated with carbonic acid, dissolves large quantities of phosphate of lime. Berzelius and Thenard had remarked that ebullition and neutralization by alkalis reprecipitated the phosphate from this solution. Dumas introduced plates of ivory into bottles of Seltzer water, and they were as much softened after twenty-four hours as if acted on by dilute muriatic acid. The Seltzer water was found loaded with phosphate of lime, and the experiment

proved the action of carbonic acid as its solvent to be both rapid and certain. I am sure this discovery will be of importance to the agricultural world.

I would call the attention of physiologists to this property of carbonic acid, as satisfactorily explaining the assimilation of phosphate of lime by plants. Of course, it would not be practicable to dissolve the phosphate by Seltzer water, but the preparation of bone ashes, by its known and powerful constituent, might be rendered available in the following manner: Where bone powder or ashes is intended for manuring soil destitute of vegetable matter, let it be mixed with leaves or other organic matter, and its decomposition, with the aid of rains and atmospherical influences, will create a sufficient quantity of carbonic acid to assimilate the phosphates in such a form as readily to be taken up by the organism of the plants. How easily could a planter manure a few acres of cotton with bone powder or ashes! When all the bones are hoarded as gold, and their true value known, they will be appreciated. Then a bone mill for crushing, and simple apparatus for their chemical reduction, will be as essential to producing the crop as a grinding mill is to prepare grain for the food of man.

Wood ashes, containing phosphates and alkalies to a considerable extent, may, where they abound, be used advantageously as a manure for cotton.

LIME,

Being useful in decomposing and ameliorating adhesive soils, might be profitably employed in the permanent improvement of cotton lands.

Common potters' clay diffused through water, and added to milk of lime, thickens immediately upon mixing; and, if the mixture be kept for some months, on the addition of an acid the clay becomes gelatinous, which is the effect of the admixture of the lime. The lime, in combining with the elements of the clay, liquefies it; and, what is more remarkable, liberates the greater portion of its alkalies. These interesting facts were first observed by M. Fuchs, at Munich, and led to the explanation of the effects of caustic lime upon the soil, which furnishes the agriculturist with an invaluable means of opening it, and setting free its alkalies, substances so indispensable to the production of his crops. The lime lands of the West producing abundant crops of cotton so long as furnished with vegetable matter, shows that lime alone upon exhausted soils would prove a doubtful aid.

It was a matter of surprise to Professor Liebig that any soil, not furnished by artificial means with the preponderating constituents of the cotton plant and seed, should produce a crop abounding in the phosphates. This leads me to further investigations, and a rich field of research lies still unexplored in the analytical examination of the cotton soils of the South and West.

THOMAS J. SUMMER.

South Carolina, 1848.

It is indeed a matter of surprise, that an article of such world-wide necessity should have been hitherto so neglected by agricultural chemists; and I am not aware that we have even now an analysis in full of the ash of the whole plant. The two best analyses are those of the stalk, by Summer and Judd. The analysis of the seed by Summer contains an error of loss and chlorine = 4.84 per cent. The same analysis (of seed) by Shepard gives an error of 1.68 per cent. of loss, carbonate potassa, sulphates of lime and magnesia, alumina and sesquioxide of iron; and Shepard's analysis of

the wool yields 6.23 per cent. loss, chloride of potassium, sulphate of lime, phosphate of potassa, and trace of sesquioxide of iron. Shepard's analyses are calculated with regard to the composition of the ash itself, instead of giving the constituents separately, which alone renders a comparison between different analyses possible, the composition of ash varying according to the nature and quantity of its constituents, and the degree of heat at which it is prepared. I have recalculated Summer's analysis of the stalk, by Weber's new analytical tables; want of data in the seed analysis rendered its recalculation impossible. I have also recalculated Summer's analyses to the hundred parts, neglecting sand, coal, and carbonic acid; and, having separated the salts in Shepard's analyses, recalculated the constituents in the same manner. The following table will show the comparative nature of the constituents of the ash of the plant, seed, and wool, as analyzed by Summer and Judd, the defective analyses above-mentioned considered as approximative:

CONSTITUENTS OF THE ASH OF THE COTTON PLANT.	STALK.		SEED.		WOOL.
	Summer.	Judd.	Summer.	Shepard.	Shepard.
Potassa, - - -	29.40	29.58	29.56	20.04	44.00
Soda, - - -	1.29	—	2.92	—	—
Lime, - - -	23.30	24.34	11.56	27.84	22.43
Magnesia, - -	6.97	3.73	11.27	0.13	4.45
Oxide iron, - -	9.56	—	3.65	—	—
Alumina, - - -	—	—	—	—	1.94
Phosphoric acid, -	18.28	34.92	37.65	48.92	19.63
Sulphuric acid, -	1.74	3.54	3.39	1.24	1.84
Chloride sodium, -	0.79	—	—	—	—
Silica, - - -	8.65	3.24	—	1.71	5.71
Chlorine, - - -	—	0.65	—	0.12	—
	100.00	100.00	100.00	100.00	100.00

DR. CHARLES M. WETHERILL.

Philadelphia, No. 206 Cherry St., December, 1852.

CHEAP DRAINING.

It is stated in the foreign correspondence of the *Michigan Farmer*, that a method of cutting drains has been adopted in Scotland requiring much less cost than formerly, being all done with the plough. It is very useful in all cases where the ground is clayey and tolerably free from stones. In the first place, a common plough is passed back and forth, turning out a furrow on each side; then follows the draining plough, which goes down from two to two and a half feet, the mould board being so formed as to turn the earth all out. In this manner twelve acres in the vicinity of Sterling were drained with three ploughs in one day, the tile being laid in the furrows just as the plough left it. The earth was returned to the ditch by means of a scraper in the form of the letter V, the legs of course protruding forward, and a team attached to each leg on each side of the ditch. We have been long since satisfied that the cost of excavating ditches might be reduced by more horse labor than is generally used. For instance, let a Michigan subsoil plough, with ample team, be set in a foot deep—a thing very easily done by throwing a furrow each way, leaving but a narrow strip in the middle; the first foot of

the ditch is at first thrown out with sufficient rapidity to prepare some miles for the spade in each day. By running twice each way, a greater depth and more perfect work might be attained. A regular and thorough system of draining is at present quite expensive, costing some twenty-five or thirty dollars per acre; and if its cost could be reduced one half by the application of horse power, it would greatly contribute towards its general introduction, and be worth millions to the country, lying, as it does in most cases, at the very foundation of successful farming.

THE COCHINEAL INSECT.



THE studies of mankind are infinitely varied. They are not necessarily confined to those departments of learning which are termed scientific. The field of philosophic inquiry is as illimitable as the universe, embracing a boundless range of physical, moral, and intellectual phenomena. Nature spreads before us a table loaded with the most delicious viands, and it is our own fault if we do not banquet on her bounty. Up then, gentle and juvenile readers, and bestir yourselves in the great field of knowledge, which, once acquired, will continue a never-failing spring of consolation and delight. The history of the cochineal insect is a proof. Down to the close of the seventeenth century, neither our dyers nor clothiers knew that they were indebted for the bright scarlet color, called cochineal, used by them to dye cloth red, to the little insect represented in the above engraving; yet so it is!

This insect was first discovered by the Spaniards in Mexico, in the year 1518, in the employ of the natives; but its true nature was not accurately ascertained for nearly two centuries afterwards. It was always supposed to be the seed of a plant, and in commerce it appears like a reddish shrivelled grain, covered with a white powder or bloom. But philosophers, by dissections and microscopical observations, ascertained its real nature. This insect feeds on a particular kind of Indian fig, called a nopal. The above engraving represents the nopal, (which is a plant consisting of stems, the buds of which are prickly,) with the male and female insects feeding upon it. The editor of "*The Student*" thus describes their habits, &c.:

"The natives, where these creatures are produced, raise plantations of the

nopal near their dwellings. It grows freely from cuttings; and these are fit to receive the insect after eighteen months. Into a small nest, formed of some thread-like substance, or cottony matter, a few females are placed, about the middle of October. These nests are affixed to the nopal, on the side facing the rising sun.

The eggs are soon laid and hatched; and as each female produces upwards of a thousand eggs, a large colony of these little creatures soon spread over the tree. It is said that six generations of them are produced in a single year.

On first leaving the egg the insects of both sexes are quite active, and run about among the leaves and branches of the trees. They are so small, however, at that time, that they cannot be seen without the aid of a microscope. They are flat ovular, without wings, and with short antennæ or horns. The females have a small, short, and almost conical beak, placed between the first and second pair of feet, which contains a sucker. It is by the means of this that they draw forth the juices of the leaves and tender stems.

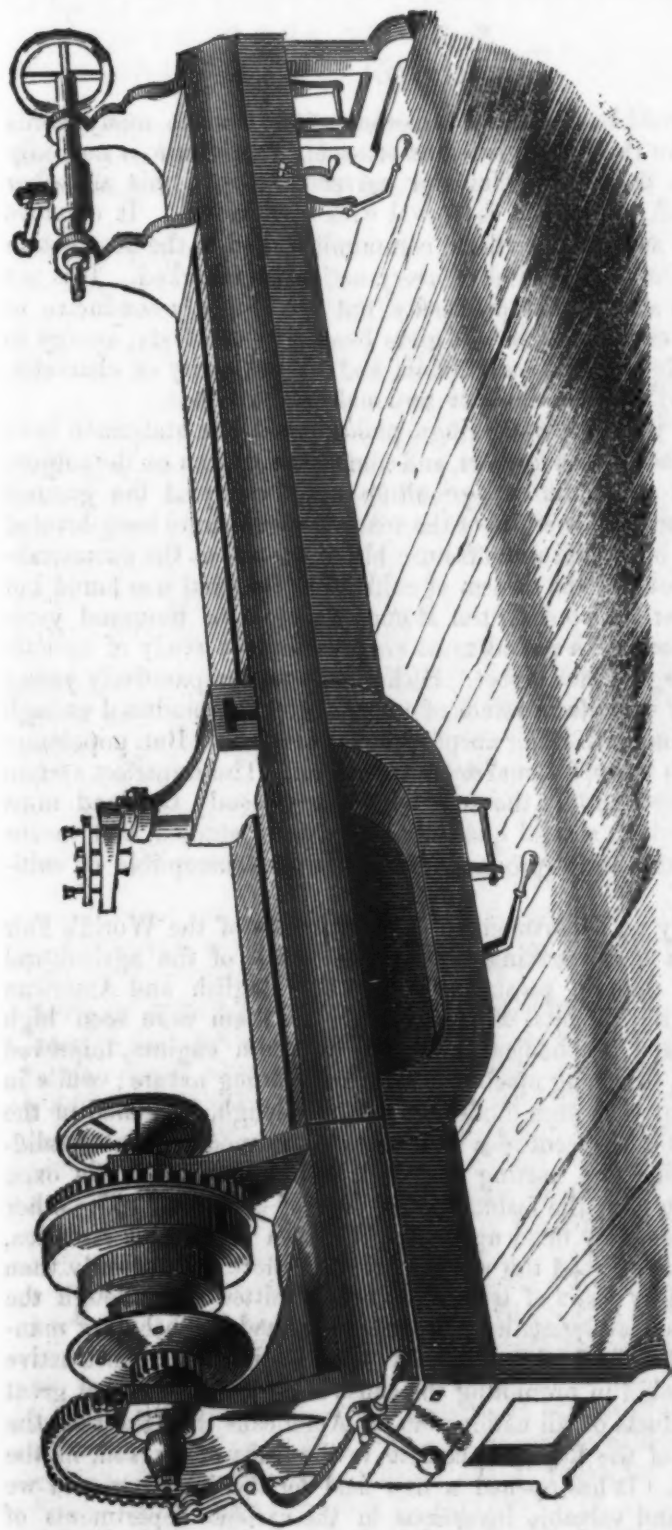
When the female has reached what is called the perfect state, it is filled with a multitude of very minute eggs. Having laid her eggs, the female never moves from her place, but dies, and her body becomes a covering for the eggs till they are hatched. When this is done, the young insects work their way out, and commence feeding. After a short time their skins harden, and serve as a cocoon. From this they pass into a chrysalis state, and soon after appear the perfect insect.

The cochineal is first collected about the middle of December. The insects are removed from the nopal with a knife, the edge of which has been blunted, or are carefully brushed off. This labor is performed by the Indian women, who often sit for hours together by the side of a single plant. The insects are usually killed by the application of heat, sometimes by baking them in ovens."

BENDING AND ANNEALING GLASS.

A VERY simple mode of accomplishing this process is practised in England, and possibly in this country. It was patented in England in September, 1851. A muffle or oven is so constructed, that the fire surrounds the lower part of the oven externally, the heat and flame of which enter the muffle through a long opening near its top, and forming a sort of arch, pass out through an opening in the top of the muffle. An upright axis revolves within the muffle, which can be raised or lowered at pleasure. On the top of this axis is a mould of the shape and size desired. When the mould has become heated, the workman places the circular sheet of glass upon the mould, and first causing it to revolve on the lower part of the oven, it gradually becomes heated, and is raised to the hotter part. When at the right heat, as observed through opening a side hole, another mould, fitted to the lower one, is fixed upon a handle, and pressed down upon the glass, forcing it to assume the shape of that on which it rests. Meanwhile, the axis is kept in constant rotation, for the purpose of securing an even heat. When this is done, the mould is removed and subjected to the process of annealing, and another mould substituted.

In this way, concave, convex, or other shaped glasses are obtained of a form suitable for reflectors, and other uses.



LATHE FOR CHUCKING AND TURNING.

CONSIDERABLE sums of money have at various times been expended, beside much labor and ingenuity exerted, in trying to bring to perfection a Chucking and Turning Lathe, but of all attempts hitherto made, the above engraving offers the likeliest attainment of success. The cut is a perspective view of the Lathe for Chucking and Turning, by the aid of a Slide Rest, that can be attached and detached at pleasure. It has a double slide; the top one of which is moved back and forth by means of a pinion wheel and rack, operated by a crank. This Lathe is 8 feet long, swings 21 inches over the top of both slides and 44 inches in a space 17 inches long over the bottom slide, when the top is set back by means of the rack and pinion as above, and weighs 1,700 pounds. It has a double geared head, is better adapted and has greater capacity for general work of machine shops than any other Lathe of its size and weight. For further particulars apply to the patentees, Messrs. Brown & White, Windsor Locks, Connecticut.

FAMILIAR LETTERS ON PRACTICAL AND SCIENTIFIC HUSBANDRY.

No. I

INTRODUCTION.

DEAR SIR :—It would be a work of supererogation to waste many words in attempting to prove that, of all arts and sciences, Agriculture is not only the most ancient, but the most useful and universal. Upon this all other arts depend, and in all countries it is coeval with civilization. It employs three fourths of this, and every civilized community ; and in the prosecution of it, nine tenths of the fixed capital of every nation is embarked. It is not only indispensable to all national prosperity, but is eminently conducive to the welfare of those engaged in it. It gives health to the body, energy to the mind ; is favorable to temperate habits and moral purity of character. Upon these are built the foundations of national independence.

Although we read that emperors, kings, philosophers, and statesmen have had a pride in being accounted farmers, and some have written on the subject, yet the study of the *principles* of agriculture never occupied the greatest minds ; on the contrary, the energies of the man of science have been devoted to the improvements of art and manufacture hitherto ; and at the commencement of the present century the system of cultivating the land was found but little advanced on that adopted by the Romans some two thousand years ago. But in every country a period must arrive when the study of agriculture becomes more urgent than before. Hitherto, in our comparatively young country, under a very imperfect system of culture, we have produced enough food for our population, with a fair surplus for exportation. But population rapidly increases, with a proportional demand for food. The imperfect system of culture will no longer supply the demands upon the soil ; the land must be systematically tilled, its special qualities and defects studied, and means adopted to extract a maximum produce from every acre susceptible of cultivation.

There was probably no department in the Exhibition of the World's Fair which illustrated in a more striking manner the lesson of the agricultural progress of nations, than in passing through the English and American departments of the implements of husbandry. In them were seen high results of ingenuity and mechanical skill, such as steam engines, improved drills, horse hoes, and threshing machines, bent to subduing nature ; while in the Indian department were seen models of the old plough, fashioned in the same rude manner as it was centuries since—then the model of a squalid-looking sower scattering and wasting the seed, and the hoofs of the oxen treading out the grain after the fashion of the days of Scripture. The other continental nations generally filled up the gap between India and America, enabling the lookers-on to read the world's progress more satisfactorily than could have been done by years of travel. It was admitted that though the greatest mechanical achievements had hitherto been made on behalf of manufactures, the era had arrived when the purely mechanical and constructive arts must bend their skill in promoting the cause of agriculture. That great gathering of the products of all nations taught Americans that the real, the inexhaustible wealth of the Republic, consists in the fruits of its soil, in the produce of its tillage. It has opened a new field for the inventors, and we may anticipate new and valuable inventions in the various departments of agricultural industry. It should therefore be a point with our countrymen not only to seek sedulously the *science* of developing the riches concealed

within the bosom of the earth, but to chronicle the present starting-point of all the available machinery devoted to the same end.

The agriculturists of antiquity, as well as those of the middle ages, were destitute of many advantages enjoyed by the modern cultivator. They had no correct knowledge of geology, mineralogy, chemistry, botany, vegetable physiology, or natural philosophy; but these sciences give the command of important agents, elements, and principles, of which the ancients had no idea. The precepts of their writers were conformable to their experience; but the *rationale* of the practices they prescribed they could not explain. Nature's most simple modes of operation were to them inexplicable, and their ignorance of causes often led to erroneous calculations with regard to effects. They had no correct knowledge of the nature and properties of manures, mineral, animal, and vegetable; the best modes of applying them, and the particular crops for which particular manures are best suited. Neither did they know the method of using all manures of vegetable origin while fresh, before the sun, air, and rain had robbed them of their most valuable properties. It was formerly the practice to place barn-yard manure in layers or masses for the purpose of rotting, till the whole had become destitute of fertility and reduced in quantity. They knew nothing of chemically analyzing the soils to ascertain their constituent parts, and thus learn what substances were wanted to increase its fertility; nor of root-husbandry, or the raising of potatoes, turnips, mangel-wurtzel, &c., extensively, for feeding cattle, by which a given quantity of land may be made to produce much more nutritive matter than if it were occupied with grain or grass crops, and the health as well as the thriving of the animals in the winter season greatly promoted. They were also unacquainted with laying down lands to grass, either for pasture or mowing, or with a greater variety of grasses adapted to a greater variety of soils, such as orchard-grass for dry land, meadow-grass for very wet land, timothy for stiff clayey soils, &c. Neither knew they the art of breeding the best animals and the best vegetables by a judicious selection of individuals to propagate from. These improvements, with many others not specified, render the agriculture of the present period very different from that of past days. It is a complicated art, and demands a general education, the study of principles, and observation. Without observation, experience and application, it cannot be practised with success. Farmers often complain that they know not what to do with their sons, and seek places for them in cities. Such places! as Mr. Greeley truly remarks, where their health and happiness are often wrecked—where, too, they have to compete with thousands. And all this, while the noble science of Agriculture is not half learned! Whereas that man who would promote the happiness and success of his sons, should bring them up to *skilled* agriculture. That is a *certain* method of providing for the future of a family, and is a better provision for youth than a city life, with its uncertainties, drinking, gambling, and smoking cigars.

Men of capital—city men who have made a sufficiency to live—often retire to the country, engage in farming, and find themselves very defective in some of the most necessary qualifications of the art, and sink in their circumstances. And necessarily so, for agriculture is both a *science* to be learned, and an *art* to be practised. The *science* consists in the knowledge of the life of vegetables, the origin of their elements, and the sources of their nourishment. The art tells *how* to preserve or render fields fertile for one, two, three, or all plants. Without an education no man can be an agriculturist. The banker does not intrust the capital of the establishment into the hands of a person unacquainted with the intricacies of the profession. The manufacturer nor the merchant commit their interests to those who are not versed in their separate

branches of business. The business of husbandry is no exception to this rule. No man can be a farmer without learning the science and practising the art. These letters we intend to be useful instructors and correct guides, giving clear narratives of all the *principles* and labors of the farm.

The Editor of the *Farmer's Library* says: "There seems in truth—and every Christian will hail all such omens with delight—to be a growing conviction that, as the field of Science enlarges, the practical man cannot fulfil his calling, whatever that calling may be, without *some acquaintance with those branches of Science which bear upon it*. The Divine, the Lawyer, the Physician, the Merchant—and he, still honored and rewarded above the best, whose art it is to destroy his fellow-man—are all of them acting upon this principle. The advance of Science in all other pursuits except farming, is making empiricism in them degrading and unprofitable. Yet the follower of each of them was once an empiric. The Farmer alone is so still. Does not then the advance of Science—may we not say his own character and self-respect—require him, too, to be a man of certainty, independent on, or rather a controller of circumstances?"

Justus Liebig, the celebrated agricultural chemist, after showing that those who are destined to the pursuit are not properly instructed in the art of husbandry, but learn it, in a way, by imitation and habit, gives the following definition of agricultural empiricism: "The empiric attributes all his success to the mechanical operations of agriculture. He experiences and recognizes their value, without inquiring what are the causes of their utility, their mode of action. And yet this scientific knowledge is of the highest importance for regulating the application of power and the expenditure of capital; for insuring its economical expenditure and the prevention of waste. Can it be imagined that the mere passing of the ploughshare or the harrow through the soil—the mere contact of the iron—can impart fertility miraculously? Nobody, perhaps, seriously entertains such an opinion. Nevertheless, the *modus operandi* of these mechanical operations is by no means generally understood. The fact is quite certain that careful ploughing exerts the most favorable influence: the surface is thus mechanically divided, changed, increased, and renovated; but the ploughing is only auxiliary to the end sought."

The only remedy for this condition of mind is an agricultural education, which is as necessary for the farmer as for the lawyer or physician; and we shall monthly sketch out such as we consider will lead the mind, by an easy and natural process, to the principles on which that business is conducted successfully. While one agricultural individual is in darkness who might be enlightened; while only one blade of grass grows where two might spring forth, the highest and holiest of duties demand that effort be exerted and experience be extended. The history of our country declares with a thousand tongues, that the advancement of art and science can only be effected by the teachings of experience through the medium of the Press.

LATHES.

In the London Exhibition, of the various machines and implements exhibited, lathes appear to have been collected in the greatest number and variety. In the report of the jury on this subject, we find commendatory notice of one sent by the Lowell machine shop, of 12-inch centre and 13-feet bed. These gentlemen say, it "will be looked on with great interest, as a specimen of first-rate transatlantic workmanship in this branch, and as offering various

peculiarities of form and distribution of metal; the latter being employed as sparingly as possible on account of the great cost of iron. Hence a lightness of construction carried to the extreme point, consistent with strength and stiffness, which presents a singular contrast to the solid proportions adopted by our own engineers."

An English lathe is described, capable of turning wheels above seven feet in diameter, and another in which "the work is acted on simultaneously by two tools cutting at the opposite extremities of the same horizontal diametrical line. Thus vibration and deviation of the work in shaft-turning is wholly prevented. The beds of these lathes are 18 and 36 feet, respectively."

ARTIFICIAL MANURES.

WE extract the following excellent article from a late English paper. It is worthy of careful study, and affords a simple guide for testing the value of all artificial manures:

1. *Nitrogen*, in the form of ammonia, or nitric acid. Nitrogen, without doubt, is the most valuable of all fertilizing substances, as it is the so-called stimulating or forcing property of manures. All cultivated plants are much benefited when richly supplied with it in a proper form, particularly at an early stage of their growth; at a later period of their development its application appears much less effective.

Nitrogen in a free state, however, is not assimilated by plants to any extent, and it is only when the nitrogen of nitrogenized organic matters has become changed by fermentation or putrefaction into ammonia, (or nitric acid,) that this elementary substance acts as a powerful fertilizer. It is for this reason that fresh bones, unfermented urine, long dung, &c., are much slower in their action than the same materials after having undergone fermentation or putrefaction. In the latter state they contain ammonia ready formed, which the plants can assimilate at once; but, in the first case, the decomposition of the nitrogenized matters proceeds slowly in the ground, particularly when ploughed in deep; and the plants are thus necessitated to wait a long time before they can absorb the ammonia which is generated during the decomposition of the nitrogenized organic matter. In stiff soils, and in dry seasons, the formation of ammonia proceeds so slowly that the beneficial action of manuring substances is often lost in the first year; because, if plants have passed the period of the most vigorous growth, they derive little advantage from the ammonia. On the other hand, manuring substances, such as guano, soot, refuse-water of gas-manufactories, sal-ammoniac, sulphate of ammonia, putrefied liquid manure, which all contain large quantities of ready-formed ammonia, exercise a most surprisingly quick forcing power on grass-land, and on wheat, and all plants at an early stage of their growth.

The effects of ammonia have been so well ascertained by numerous practical experiments, in which it has been applied with the exclusion of all other substances, that few practical men at the present time will hesitate to ascribe the rapid forcing effects of guano, of the ammoniacal liquor of gas-works, &c., to the ammonia which they contain.

2. *Phosphoric Acid*.—Next to ammonia, phosphoric acid must be regarded as the most valuable compound in artificial manures. It occurs in soils but in small quantities, and as it is an essential constituent of all cultivated plants and particularly required for the perfection of grain, its deficiency in the soil

is at once indicated by the poor small ears of wheat, oats or barley. Phosphoric acid exists generally in artificial manures in the form of bone-earth or phosphate of lime.

3. *Alkalies, potash and soda.*—Other valuable fertilizers are potash and soda, or rather salts of potash or soda, particularly the first. In their chemical relations, potash and soda resemble ammonia; and this similarity is also shown in their action, which, like that of ammonia, is forcing or stimulating.

All cultivated plants, particularly root-crops and herbaceous plants, require potash as a necessary article of food, for they show in their ashes large quantities of it. It is for this reason that turnips, carrots, and other green crops, are much benefited by the application of burnt clay, in which, as I have shown in this Journal some time ago, a much larger quantity of soluble potash exists than in natural clay. For the same reasons these crops are much benefited by wood ashes and liquid manure, which both contain considerable quantities of salts of potash.

How soon does an artificial manure act?—Chemical analysis, in many instances, is capable of satisfactorily answering this question. Those constituents of an artificial manure which are soluble in water, or which are easily rendered so by a rapid decomposition, benefit plants in the first year; those which are soluble in acids, or which decompose more slowly in the ground, exercise the chief fertilizing action on plants in the second or third year; those, finally, which are insoluble in acids, or which decompose still more slowly, can only benefit vegetation at a still more remote period.

How are artificial manures best applied to the land? In what state? At what time? In what quantities?—Practice alone can give correct answers to these questions. Theory in many instances may throw out some valuable hints, but can never give special directions, as the nature of the soil, the position of the land, the climate, and numerous other local influences, necessarily must greatly alter the mode of application of artificial manures. The best mode of application is entirely dependent on circumstances, and can only be established in every separate instance by practical experience.

What is the value of an artificial manure?—This question, undoubtedly, is the most important to the farmer, and happily one, the solution of which chemistry will greatly facilitate.

The external characters are insufficient indications of the real value of an artificial manure: a much better guide to the correct estimation of its value is chemical analysis. The farmer, however, will derive benefit from analysis only when he can calculate from the analytical data the money-value in an easy manner. In order to enable him to do so, he requires to know the market price of each of the constituents of the manure. By a simple rule of three he can then ascertain the value of the whole manure.

Calculations of this description, however, are not so simple as they might appear to be, and often present insuperable difficulties, arising from the want of a standard price of several of the constituents of artificial manures. Many of them are not found in trade at all; others, like potash, soda, sulphuric acid, &c., which are articles of commerce, are always sold in a more or less purified state; but it is clear that the commercial value of such materials cannot be accepted as the standard price, because the value of an artificial manure, in which the same substances occur in an impure state, would be estimated far too high. A third difficulty in ascertaining the commercial value of manuring substances arises from the circumstance that two, three, or four simple substances occur together, in the fertilizers of commerce, which renders it very difficult to assign to each its proper value.

It would lead me too far to enumerate all the reasons which could be assigned for fixing the price of some of the more frequently occurring manuring substances which follow. However useful the subjoined table may be to the practical man, considerable latitude must be allowed in estimating the real commercial value of an artificial manure; and as all articles of commerce are subject to considerable fluctuations, it follows, necessarily, that the price-list subjoined can have no permanent value.

Table for determining the Value of Artificial Manures.

1. Every lb. of nitrogen, in the form of ammonia or nitric acid, may be estimated at	-	-	-	-	-	-	-	8
2. 1 lb. of nitrogen, in the form of nitrogenized matters, at	-	-	-	-	-	-	-	6
3. Organic matters, free from nitrogen, (humus,) 18 lbs., at	-	-	-	-	-	-	-	1
4. Salts of potash, 1 lb., at	-	-	-	-	-	-	-	1
Or potash separately, 1 lb., at	-	-	-	-	-	-	-	1½
5. Salts of soda, 9 lbs., at	-	-	-	-	-	-	-	1
6. Phosphate of lime, 1 lb., at	-	-	-	-	-	-	-	$\frac{3}{4}$
Or phosphoric acid, separately, 1 lb., at	-	-	-	-	-	-	-	1½
7. Gypsum, 6 lbs., at	-	-	-	-	-	-	-	1
8. Lime, 12 lbs., at	-	-	-	-	-	-	-	1

For all practical purposes, the determination of the value of the remainder of the substances, which are usually indicated in the analyses of artificial manures, such as oxide of iron, alumina, silica, &c., may be entirely neglected.

The chief questions which the farmer requires to have answered by the chemist are—

a. How much, in 100 lbs., does the artificial manure contain of—1. Nitrogen; 2. Organized substances; 3. Salts of potash; 4. Salts of soda; 5. Phosphate of lime; 6. Gypsum; 7. Carbonate of lime, or of magnesia?

b. In what combination does the nitrogen exist? In the form of ammoniacal salts? Or in the form of nitrates? Or in the form of nitrogenized organic matters? Do the latter enter easily into putrefaction, or do they decompose with difficulty?

The answer to the first question, *a*, including the above-mentioned seven points, will enable the farmer to calculate the commercial value of the manure. The answers to the other questions, *b*, will teach him approximately whether the manure is likely to act quickly, or whether it belongs to those, the full fertilizing effects of which are brought out only in the second or third year.

Bone dust resembles, in its chief constituents, the solid excrements of animals, and straw, and differs from them chiefly by being much richer, as will be seen by the following comparison:

Constituents.	1,000 lbs. of bone-dust.	1,000 lbs. of fresh cow or horse-dung.	1,000 lbs. of dry straw.
Nitrogen, - - - -	50	4	4
Phosphoric acid, - - -	240	3	2
Lime, - - - -	330	4	4

Bone-dust thus contains about twelve times more forcing substances, and eighty to a hundred times more grain-forming materials, than dry straw or the solid excrements of animals.

With regard to the application of bone-dust, I would observe that the usual practice of applying bones, as $\frac{1}{2}$ inch or $\frac{1}{4}$ inch bones, cannot be recom-

mended. In this state they decompose very slowly in the ground—so slowly, indeed, that ten or twenty years may be required to dissolve them entirely.

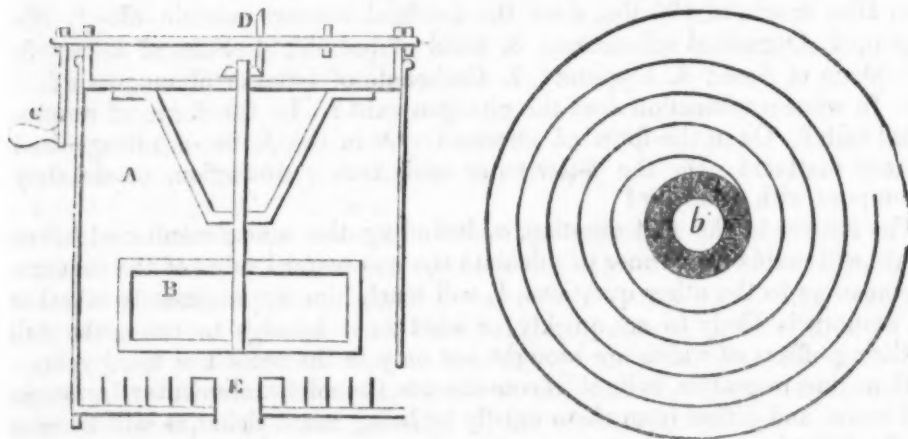
Dissolved Bones.—A great many analyses of commercial dissolved bones, or super-phosphate of lime, having been published lately by Dr. Anderson and Professor Way, it is not necessary for me to cite many analyses of commercial super-phosphate. I shall therefore merely give the examination of one sample of super-phosphate, as it affords an additional proof of Dr. Anderson's observation, that this commercial article is frequently of a very inferior quality :

Super-Phosphate of Lime.

Water,	- - - - -	6.30
Organic matter,	- - - - -	9.32
Phosphate of lime,	- - - - -	34.25
Phosphate of iron,	- - - - -	6.57
Sulphate of lime,	- - - - -	28.31
Sulphate of magnesia,	- - - - -	2.42
Sulphate of soda, with a little sulphate of potash,	- - - - -	6.38
Silicious insoluble matters,	- - - - -	6.45
		<hr/>
		100.00

This article, which in reality did not contain any soluble phosphate of lime at all, was offered for sale at £7 10s. per ton.

BUFFUM'S PERFECTED GOLD SEPARATOR.



WHEN it was announced that the hills, the valleys, and the rivers in California were one vast field of golden ore, open to individual enterprise, the attention of inventive genius was drawn to a careful investigation of the known methods of separating gold from the ores in which it is imbedded; and on ascertaining that they were universally defective, a great variety of new mechanical arrangements were brought forth, intended for a more perfect performance of this productive labor.

It has long been well understood that between gold and quicksilver there is such a chemical affinity, that when they are brought into contact with each other, and that contact is continued over a sufficient distance to secure an adhesive covering of the quicksilver over each separate particle of gold, they

become united in amalgam. But in the mechanical arrangements, both ancient and modern, the chief obstacle to complete success has been the insufficiency of any well-understood scientific principles which can be so applied as to unite the gold and quicksilver in amalgam, and retain the quicksilver in security, with a current of water sufficiently powerful to keep the heavy sands in a floating position, so as to wash all impurities away.

In the arrangements where the rocking or shaking motion is relied upon for carrying off the sand, and especially where all is stirred and mixed up together, the quicksilver becomes broken into globules, and escapes with the sand, and is lost.

In other arrangements, the black sand, pyrites, and sulphurets settle, and form a cake on the surface of the quicksilver, and prevent a contact of the gold with the quicksilver; and in all heretofore introduced, the distance which the sand passes in contact with the quicksilver is too limited to insure an amalgam of a fair percentage of the liberated gold.

In consideration of these difficulties, it is conceded that, in the pulverized gold-bearing pure quartz, from twenty-five to fifty per cent. of the gold is lost; and that in the ores which are densely saturated with pyrites and sulphurets, and in the black iron sand, any attempt at separation by the ordinary processes is entirely unavailing.

But we are now authorized to announce that Arnold Buffum has made discoveries of scientific principles in the action of fluids in whirlpools, different from the theory of all professional scientific writers on the subject, by which, with a very simple mechanical arrangement in one cistern, he gives to golden sand a thorough washing, and then passes it in contact with quicksilver over such a distance as insures an amalgam and saving of *all the gold*, while the heaviest sulphurets and pyrites and all sands are washed clean away.

This arrangement consists of a cistern, with an irregular spiral passage-way on the bottom plate, commencing at the periphery and ending at the centre; with a discharge aperture surrounded by a conical ring at the centre of the cistern bottom. Suspended in the cistern immediately above the spiral passage-way, is a horizontally revolving table, making a division between the upper and lower part of the cistern, excepting a small space around the periphery of the table.

In practical operation, the bottom of the cistern is covered with quicksilver; a stream of water and golden sand are poured in at the top of the cistern; the horizontally revolving table gives to the water a rapid whirlpool motion; the agitation of the whirlpool above the table commingles the ore with the water, and washes away all impurities from the surface of the gold before it reaches a contact with the quicksilver; the circular motion of the whirlpool below the table keeps the sand in a floating position, and circulates it in the channels which form the passage-way; the centripetal motion of the water which rests upon the quicksilver carries the sand spirally to the discharge aperture at the centre of the cistern bottom, where it passes away, leaving the gold *all* absorbed by the flickering counter-motion of the whirlpool in the quicksilver.

The cisterns vary from ten to twenty-four inches in diameter, being altogether very light, compact and portable, and adapted to gold mining of every description, in all places.

They are exhibited in operation, washing gold every day, at the Gold Mining Depot, No. 8 Battery Place, New-York.

The patent bears date the 21st day of October, 1851.

The practical results of the machine have won for it the appellation of "Buffum's Perfected Gold Separator."

MILK—CHEESE—BUTTER.

MILK contains some 12 or 13-100ths of solid matter. The remainder is a liquid. It is coagulated by acids and by rennet. Milk consists of water, caseine, milk of sugar, small quantities of several salts, and butter, and fats. When milk turns sour, lactic acid is produced.* An atom of grape sugar contains two atoms of lactic acid, the formula of the former being, C^{12}, H^{12}, O^{12} , and of the latter, C^6, H^6, O^6 .

Fatty substances readily absorb oxygen and become rancid. Acids are formed, in other words, and the peculiar character of the acid is transmitted to the entire mass.

The spontaneous coagulation of milk is owing to the formation of lactic acid, and is the incipient step in decomposition. This acid is formed by the sugar of milk and the oxygen of the atmosphere.

Let us describe the elementary substances which are found in milk, and which we have already enumerated :

CASEINE is the substance of cheese, and its composition is very nearly the same as that of blood. The formula for caseine is, carbon 54.825, hydrogen 7.153, nitrogen 15.628, oxygen and sulphur 22.394 ; while that of the fibrine and albumen of blood is carbon 53.850, hydrogen 6.983, nitrogen 15.673, oxygen, sulphur, and phosphorus 23.494.

In cheese, the caseine is combined with fatty matter, and its proportion depends upon various circumstances, as we will presently explain. It may be separated from the liquid parts of the milk by different methods ; but all the means used are effectual by inducing the incipient stages of fermentation or decomposition. Thus rennet, from the stomach of the calf, is in fact a membrane already in this condition. The presence of this in milk induces a similar process in it, and the caseine or curd is separated from the *whey*—that is, from the liquid which remains.

The curd differs entirely from the cream, and must not be confounded with it ; but in its coagulation it envelopes and incloses, as it were, the cream, and thus the latter is contained in all cheese made from new milk. But the cream is not only unlike the caseine, but neither forms any portion nor proportion of the other.

Caseine is the only nitrogenized substance found in milk, and hence it is the only portion of it which can be converted into animal tissue without the addition of other kinds of food. All the other portions of milk are of service only to deposit fat and excite animal heat. But though an essential part of the milk when it is to be used as food, it is found that animals cannot thrive for a long time if confined to the use of caseine exclusively. The diverse and opposite effects of cheese, as a general article of food, on health, are the result of various conditions, such as the condition of the curd when the cheese is formed ; the presence or absence of fatty matters, and if these are present, they may or may not have become rancid ; the presence of foreign ingredients added to the substance or the surface of the cheese, either for giving flavor, color, &c. ; and its hardness or dryness, the result of pressure, age, &c. The cheese known as Stilton cheese is made from new milk, with a quantity of

* We wish our readers to be familiar with the symbols of chemistry. For the benefit of those who are not, let us add here, that C stands for carbon, H for hydrogen, and O for oxygen ; and that the figures after each letter denote the atoms of each that are contained in one atom of the compound.

cream added. Parmesan cheese is made from skimmed milk. Cheshire cheese is made from new milk, without any addition. Double Gloucester is made from fresh milk, and single Gloucester from milk about half of which has been skimmed. Cream cheese is no cheese, but cream from which the watery parts have been drained. Such at least are the distinctions of the various sorts of cheese, as given by Solly. And yet we must be allowed to remind our readers that the strictest attention to these distinctions will scarcely secure for them the eminence which has attached itself to some of the names we have described. The richness and other qualities of the cheese must necessarily be dependent, not only on the conditions already suggested, but also upon the quality of the milk, and this again upon the food which forms the milk. If any one doubts that the character of the food materially affects the character of the milk, let him feed his cow with onions, garlic, &c., or *pamper* her on the active products of a distillery. Often, carrots are fed to cows both to give flavor and color to the butter which is obtained from their milk.

We do not, however, purpose to enter here upon a treatise on cheese-making. We prefer to leave this in the hand of the skilful dairyman, while we should be very happy both to commend his skill, as tested by our own experience of the quality of his cheese, and to make known, in detail, the mode by which his success was attained. But we add a single remark on this head. It is said that exercise increases the amount of caseine in milk, while rest is favorable to a liberal supply of butter. This seems to accord with the well-known laws of Physiology.

Milk of sugar is the next constituent of milk which we have named. We might have said *sugar of milk*, as it is, only that it is not in *the form* of sugar, but is held in solution. It may be separated as sugar, and is then found to be essentially like the sugar of the grape, or the cane. There is however a slight difference in the proportions of the elements of sugar obtained from these different sources. Thus, the formula for sugar of milk is C^{12}, H^{12} and O^{12} .

That for sugar of grape is C^{12} , and water 12, or H^{12} and O^{12} .

And that for cane sugar is C^{12} , and water 14, or H^{14} and O^{14} .

BUTTER is the next important constituent part of milk. It contains six different fats, each essentially distinct from the rest. Four of these always remain in a liquid form, while the other two may be crystallized. They are as follows: Stearine, margarine, oleine, butyrine, caproine and caprin. The first of these, stearine, is the basis of all fats; it is crystalline, like spermaceti. Margarine resembles stearine, but is more soluble. If solid fat is melted and kept for a considerable time in a liquid form, the solid portions will separate, when cooled, in crystalline grains. When this is subjected to pressure, a fluid is separated from it, which is LARD OIL, while the margarine and stearine are used in the manufacture of candles. The addition of a little alcohol is useful in securing a readier separation. Oleine constitutes the mass of liquid fixed oils, which are not drying oils. It is found nearly pure in the expressed oil of sweet almonds. It remains liquid at 0 of Fahrenheit. Oleine is composed of glycerine, margarine acid, and the elements of water. Butyrine is that which gives its agreeable flavor to butter. It is colorless, and becomes solid at about 32 degrees of Fahrenheit.

CREAM consists, according to the statement of Berzelius, of 92 parts of whey, 4.5 of butter, and 3.5 of caseum; while skimmed milk contained some caseous matter and butter, with sugar of milk, chloride of potassium, alcoholic extract of lactic acid, alkaline phosphates, earthy phosphates, and a trace of iron. If sulphuric acid is added to skimmed milk, the caseum is precipitated as a white coagulum. It is also precipitated by alcohol.

But probably no analysis of milk from different cows would exhibit the same result ; and milk from the same cow, with different kinds of food and different treatment, will also vary. So also the character of the milk varies in summer and in winter. Milk from a fat cow, and from the same cow when lean, is also said to contain different proportions of caseum and of cream.

A very simple contrivance for learning the proportion of cream in different samples of milk is now very common. It consists of a few small tubes, graduated and set in a frame. As the cream separates and rises, the relative proportion of cream and skimmed milk is at once obvious. But as caseine is not always found to be in the same proportion as cream, what is best for making butter may not be best for making cheese. It is, however, a very practicable affair to precipitate the caseine by the use of alcohol, in a tall, narrow glass vessel, so that its quantity can be readily seen ; and we know not why such tests are not as important as those for cream. For cheese consists, as we have already explained, of caseine and water, with such fats as are confined within the substance of the coagulum.

In cream, as already stated, the butter is collected. It consists of minute globules, or as one writer at least, whom we remember, has if, it is confined in little sacs, which must be broken up, and their contents gradually collected into one mass ; and this is the work which the process of churning accomplishes.

The practical bearings of these and similar facts are of vital consequence. It is not the "greatest milker" that produces the most butter or the largest cheese. Mr. A. W. Dodge, in an official paper, informs us that the milk of a cow held in high estimation for her large yield of milk was found to afford cream of only $\frac{4}{10}$ of an inch, by the lactometer, while that of a low-priced cow, of the same herd, gave cream $1\frac{4}{10}$ inch in thickness, and of a much yellower color. Let experiments be made on these qualities of milk, both in regard to cream and caseine ; for though it *may* be true, as a general rule, that milk which abounds in cream also abounds in caseine, we doubt whether the fact is ascertained by extensive and careful experiments.

LESSONS TO FARMERS AND MECHANICS.

THEORY vs. PRACTICE.—NO. I.

Nothing is more common than to hear, from the lips of seemingly sensible men, the announcement, that some proposition "may be right in theory, but is undoubtedly wrong in practice." Theory can be opposed to practice only by those who use the term in ignorance of its appropriate meaning. The relation which exists between theory and practice is not that of opposition or contrast. It is a relation of homogeneousness or comparison. Theory, by those who use the term understandingly, is meant to designate the *general principles of correct practice*. The term theory, applied to that which is not altogether practical, is a misnomer, and nonsense. The material distinction between the meaning of the terms theory and practice is, that practice describes a set of operations or experiments not necessarily methodized ; theory is the name under which any class of generalized or philosophically-arranged experiments may be comprehended. Practice indicates a certain method of acting, in relation to which the corresponding theory points out the most excellent way. And hence, in opposition to the common conception on this

subject, it may be seen that practice, unaided by theory, properly so called, has only the *chance* of being right; whereas theory never can be wrong.

Keeping this view of the subject in mind, there can be little difficulty in comprehending in what respects a theoretical knowledge must be advantageous to the Farmer and Mechanic. Every degree of dexterity in handicraft or chemical or mechanical labor is acquired by reiterated attempts to imitate some model, either actually observed, or otherwise brought before the eye of the mind. Merely to imitate thus the actual model, is usually denominated practice; to work in obedience to a conception of the operation formed from the idea of a more perfect model, is to work theoretically. To imitate an actually observed model, is thus to work in obedience to a conception necessarily imperfect; because from the unavoidable derangements to which muscular action is constantly subject, all human operations fall short of absolute correctness. To work theoretically, is to act in obedience to a conception which must be correct; inasmuch as the very conception is the true model of the work to be done. The perfection of practice, therefore, is merely to do equally well what is held up as having been done before. Beyond the degree of imitation necessary to accomplish this, practice, properly so called, cannot go. All beyond this is the result of theory; so that if one harbor the slightest desire for improvement in the conduct of any of his operations, he must theorize, however unconscious he may be of such a process of thought. The value of theoretical knowledge may be thus considered as co-extensive with the desire for improvement. In fact, the source of all human improvement may be traced to that quenchless thirst for greater enjoyment of some sort or another, which is found to actuate the bosom of every individual. The wish to be placed in circumstances which shall be, in some respect or other, more favorable than those already experienced, is one of those primary feelings which go to form the mental constitution of man. It grows with our growth and strengthens with our strength. It comes with us from the cradle, and leaves us only at the grave. And it is to the gratification of this feeling in the breast of the scientific farmer and practical mechanic, that the acquisition of theoretical knowledge directly conduces.

It is now clear that it is theory of some kind or other (that is, observation of facts, and a consequent classification of some sort or another) which is at the bottom of every improvement, however trivial. For the performance of any mechanical operation, it is true, muscular facility is indispensable, and this facility can be acquired only by repeated efforts. So far, therefore, a certain amount of mere practice is absolutely necessary to the creditable performance of any operation whatever; but that facility once gained, the man who acquaints himself with the theory of the operation—that is, who compares the results of his labors with other results so as to connect the particular operation in question, as one of a more extensive class of operations, among which he has discovered some common feature of resemblance—is in a condition to apply his muscular dexterity more extensively than before, and hence becomes a more skilful, dexterous, and useful workman than before. This is the immediate and obvious advantage which theoretical knowledge brings with it to the practical ploughman and mechanic. They have only to court its acquisition, and the magnitude of the advantage will be in proportion to the variety, amount, and quality of the knowledge consequently gained. They will become distinguished for greater ability and skill than their fellows, and consequently soon shoot ahead of them in the career of independence and comfort.

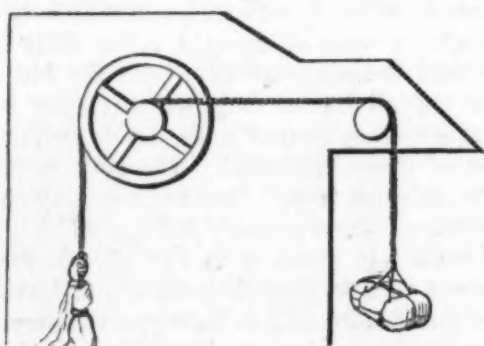
But farmers and mechanics are not the only parties benefited by the

spread of theoretical knowledge, in alliance with practical; the community at large are gainers in proportion to the wideness of dissemination. It should be taken into account, that in all works requiring for their execution combined labor, the ability of the workman is scarcely less important than the skill of the employer. There may be cases where the workman is a mere machine, but in most cases where workmanship is worth notice, skill, discretion, and thought, in various degrees, are requisite. Employers may plan with ability, but unless supported by workmen who can bring to the execution of their plans theoretical knowledge, as well as practical, their plans and superintendence will often be bootless. The general public are therefore concerned, not only in having mere muscular or practical and routine farmers and mechanics, but in having them imbued with the SCIENCE of the VARIOUS OCCUPATIONS.

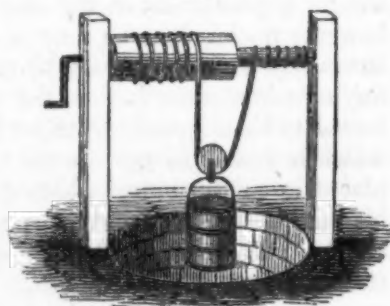
MECHANICAL POWERS.

LEVER, WHEEL AND AXLE.

1.



2.



THE general definition of a machine is, any instrument employed to regulate motion, so as to save either *time* or *force*. No instrument saves both time and force, for it is a maxim in mechanics, that whatever we gain in the one of these two, must be at the expense of the other. The simple machines are usually reckoned six: the lever, the wheel and axle, the pulley, the inclined plane, the wedge, and the screw. The weight signifies the body to be moved, or the resistance to be overcome; and the power is the force employed to overcome that resistance, or move that body.

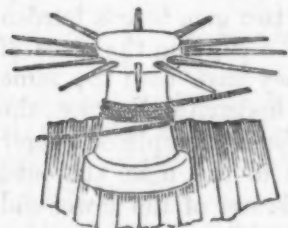
A lever, as every reader knows, is a bar or rod, supposed to be perfectly rigid, and without weight. It may be bent or straight, simple or compound, and supposed capable of turning round a fixed point, called the *fulcrum*. Simple levers are such as a crowbar for raising stones, and a poker, used for raising coals in the grate, the bar of the grate being the fulcrum. Another instance of the lever is in a chipping knife, fixed at one end, which is the fulcrum; the wood to be cut is placed under it, and is the load, or resistance to be overcome or moved, and the power is the hand of the workman at the extremity of the blade. A wheelbarrow is also a lever, the wheel being the fulcrum, the contents of the barrow the weight, and the man wheeling it the power. In the common form of wheelbarrow, the load is made to incline as much as possible towards the wheel. This of course is an advantage, because the man bears as much less of the load as its centre of gravity is nearer to the axle of the wheel than to his hands. An oar is also a lever. So is a fish-

ing rod. Scissors, snuffers, or pincers, consist of two levers turning on a pivot or rivet, which serves as the fulcrum, on one side of which power is applied to overcome resistance on the other side. A pair of nut-crackers is formed by two levers, moving on a hinge as a fulcrum. When two men bear a burden on a hand-barrow, one of them may be considered as occupying the place of the power, and the other that of the fulcrum. If they have both the same degree of strength, and can support the barrow in a horizontal direction, the weight or burden should be exactly between them; for if it be placed nearer to one than to the other, an advantage will be given to the man stationed farthest from it; and in going up or down hill, the bearer of the lower end of the barrow or plank must support the greater part of the resistance.

Among the various applications of the lever, one of the most useful and important is in the construction of the common balance, styled, from its adventitious appendages, a pair of scales. The beam, which is the essential part of the machine, is nothing more than a lever of the first order, having equal arms, and turning freely on its fulcrum, or centre of action. It is hardly necessary to add that its use is to ascertain the weight of bodies by equipoising them with an authorized standard, and the principle on which this is effected has been already amply illustrated. There are, however, some circumstances requisite to insure the accuracy of a balance, which deserve to be noticed. The beam of the balance should be so formed that its centre of gravity may be placed just below the axis or centre of motion; for if the centre of gravity and centre of motion coincided, it must be obvious that the beam would rest in any position instead of assuming the horizontal direction necessary to indicate the equality of weights on each side. However, when a very delicate balance is required, its beam must be so constructed that the centre of motion may be as near as possible to the centre of gravity, but somewhat above it. The extremities of the arms of a balance are named the points of suspension, to which are fixed the scales; and those points should be so situated that a straight line extending from one to the other would touch the point on which the beam turns. The sensibility of the balance is likewise influenced by the form of the fulcrum; and in the most accurate balances the beam rests on a knife-edge moving on agate, polished steel, or some very dense and smooth surface. Equal nicety is required in the suspension of the scales, which should hang from thin edges.

The principal use of the common lever is for raising weights through small spaces, which is done by a series of short intermittent efforts. After the weight has been raised, it must be supported in its new position while the lever is re-adjusted to repeat the action. The chief defect, therefore, of the common lever, is want of range and of the means of supplying continuous motion. The wheel and axle, as represented in our engravings, is a kind of lever so contrived as to have a *continued* motion about its fulcrum, or centre of motion, where the power acts at the circumference of the wheel, whose radius may be reckoned one arm of the lever, the length of the other arm being the radius of the axle, on which the weight acts. It will be observed in cut 1, that the wheel and axle consists of a wheel having a cylindrical axis passing through its centre. The power is applied to the circumference of the wheel, and the weight to the circumference of the axle. In the wheel and axle, an equilibrium takes place when the power multiplied by the radius of the wheel is equal to the weight multiplied by the radius of the axle. Cut No. 2 is another very familiar illustration of the wheel and axle. A large cylinder reaches half across the well, and a small one across the other half, both joined together. One end of a rope is fastened to the large cylinder, and another end to the

small one. Midway on the rope hangs the bucket. By turning the crank attached to the end of the large cylinder, a great deal of power is exerted without great personal strength.



WINDLASS.—NO. 3.

The annexed cut of the windlass represents one of the most efficient forms of the wheel and axle. It is constantly used on board ship and in dockyards. It consists of a vertical spindle fixed firmly as in the deck of a vessel, but turning on its axis and supporting a drum, or solid cylinder connected with it, and having its periphery pierced with holes directed towards its centre. It is then worked by long levers, inserted in the holes by men who walk in succession round it, and thus make it revolve, while a rope or cable wound about the axle may act with force sufficient to weigh a ponderous anchor.

The efficiency of this machine, the windlass, as a concentrator of force, is augmented either by diminishing the thickness of the barrel, or by increasing the length of the winch; but the barrel would be too much weakened if diminished beyond a certain extent, and the winch becomes useless if lengthened beyond the radius of the circle which the hand and arm can conveniently describe. Hence arises a necessity for multiplying the *long* arm of the lever and making it into several radii, in the same way that the *short* arm was multiplied to form the pinion or the barrel. This repetition of the longer arm constitutes the *wheel*, which is commonly reckoned as the second simple machine, although only a modification of the first. The advantage of the wheel over the single spoke or winch is, that however long its radius, it can always be turned continuously by a force whose action is confined to a small part only of the circumference. This can be effected in either of the modes above described in the case of the short arm, viz.: first, by forming projections on the rim of the wheel, to be successively acted on by the power in the same way that the leaves of the pinion successively act on the resistance; or secondly, by passing a rope or band round the wheel.

FOR THE PLOUGH, THE LOOM, AND THE ANVIL.

STOWELL'S EVERGREEN SWEET CORN.

He who expects to find this article of corn as much superior to the common kinds, as the ambrosia of the gods was to the food of mortals, will lay down his cob and pick his teeth in disappointment. He will rise from the table and call it a humbug. The fact is, he who has good sweet corn upon his table, picked at the right time, and well cooked, has an epicurean dish that he might ask any sensible god in the Mythology to partake of, without fear of refusal. Should some German commentator upon classic lore undertake to prove that this was the veritable ambrosia, it would be difficult to disprove the position. The man who does not appreciate sweet corn as a standard of gustatory excellence, is not the man to appreciate any edible. But, were the Stowell's decidedly superior to all other kinds for the table, we should not expect to have the multitude believe it, even after they had tried it. We have heard a very sensible man assert that the common field pumpkin made as good pies as the marrow squash, of Boston notoriety. From that date our faith was very much strengthened in the old adage, "There is no use in disputing about tastes." If this new variety of corn is as good as the old for the table, and has other excellences that the old does not possess, it will prove an acquisition.

It has been introduced to the agricultural public mainly through the agency of Professor Mapes, who has sent out thousands of samples of the seed to the readers of his paper in various parts of the country. He gives the following account of its origin in his paper for December, 1850: "Stowell's sweet corn is a new sort, and is every way superior to any other we have seen; for, after being pulled from the ground, the stalks may be placed in a dry, cool place, free from moisture, frost, or violent currents of air, (to prevent drying,) and the grains will remain full and milky for many months. Or the ears may be pulled in August, and by tying a string loosely around the small end, to prevent the husks from drying away from the ears, they may be laid on shelves and kept moist and suitable for boiling, for a year or more. This corn is a hybrid, between the Menomony soft corn and the northern sugar corn, and was first grown by Mr. Nathan Stowell, of Burlington, N. J. Near the close of the Fair of the American Institute, 1850, I presented the Managers with two ears pulled in August, 1849, and twelve ears pulled in 1850. They were boiled and served up together, and appeared to be alike, and equal to corn fresh from the garden.

"The ears are larger than the usual sweet corn, and contain twelve rows. To save the seed, it is necessary to place the ears in strong currents of air, freed from most of the husks, and assisted slightly by fire heat when nearly dry. In damp places this corn soon moulds, and becomes worthless. The seed, when dry, is but little thicker than writing paper, but is a sure grower. The stalks are very sweet, and valuable as a fodder."

A writer in the *Rural New-Yorker* tried it in 1851, and speaks thus of it: "Until it began to tassel out, it appeared very much like enormous broom corn, and exhibited no symptoms of putting forth ears until very late in the season, when it eared rapidly and bore three very large, full ears on all the best stalks, and in some cases the fourth was fairly set. Only a very few of the stalks bore single ears. It matured rapidly and very perfectly; but it was many weeks after frost set in, and the corn was housed, and after the husks had become entirely white, before any of the kernels presented the shrivelled appearance of sweet corn.

"That it will do all that has been said of it I have no reason to doubt, as far as my observation through one season extends. I am satisfied it is a most valuable acquisition to our sweet corn. It grows freely, is of the first quality, and produces in my garden this season far beyond any corn I have ever seen. Besides the greater number of grains on a stalk, each ear and kernel is very large, although it dries down for seed to a very small ear and kernel. Very few of the ears have less than fourteen rows, and I have just noticed an ear of it only seven inches long, and yet it had sixteen rows, and contained more than eight hundred kernels. The day I planted this corn I planted an equal number of hills of a very superior kind of sweet corn, the kernels of which most perfectly resembled this; and although the exposure and soil were equal, yet the Stowell corn surpassed it in every respect. I shall try it another season with increased interest."

Another writer in the same paper gives us his experience for 1852: "When I read of the wonderful productiveness and keeping quality of this new kind of corn, I rather regarded it as a humbug. However, I bought a gill of seed for twenty-five cents, and planted it, May 25th, in rather an unfavorable spot for late planting. But it matured in good time, and produced from three to seven perfect, good ears on a stalk; and one stalk had on it sixteen—the shortest about two inches, but well filled out, and all ripe enough, and good

for seed. I wish to record my vote in favor of the evergreen corn, *that it is no humbug.*"

I will add to these trials of the article my own experience for the last two seasons. I procured a few seeds, from the office of the *Working Farmer* in New-York, in the spring of 1851. I planted them late, but owing to drought only six kernels came up. I had eighteen perfect ears from these six kernels, and two imperfect ones. This showed the corn a very superior bearer. The growth of stalks was large.

I had now seed enough to plant about one third of an acre, after giving away some to friends. The soil was badly exhausted by cropping, and was not highly manured. But the growth of stalks was large, and the yield of corn was satisfactory; though the season was one of great drought, and corn suffered much throughout the country. Some of the stalks had three ears, and many of them two, with settings for more, showing what it had a mind to do, if the soil had been in better heart, and the season more propitious. I have no doubt that in very rich soil there will be often three ears upon a single stalk, and some stalks of twice that number. We may then set down the advantages of this sweet corn, as mainly the following:

1st. Its exquisite flavor is not injured by the hybridizing, as has been the case with other attempts at crossing the sweet corn with other varieties.

2d. It secures a very much larger yield of corn. The number of rows upon an ear varies from eight to twenty. A very large proportion of them are twelve and upward. Most of the large ears have from four hundred to eight hundred kernels upon them. Then we have more ears upon a stalk.

3d. It prolongs the season of green corn until frost comes; and if it be pulled up by the roots and sheltered, it lengthens it until freezing weather.

4th. If you have a fruit room where you can command the temperature, you can have green corn the year round on the cob. But as we have no such room, we have not tested the corn in this respect.

5th. It furnishes the largest amount of fodder of any kind of corn grown in the North. Prof. Mapes says, "The Stowell corn when thickly sown will yield double the burden of stalks and leaves of any other corn we have tried. It is more easily cured, and preferred by cattle even to the best English hay."

The only drawback to be apprehended, and this perhaps is imaginary, is the danger of its crying back to the originals from which it was produced—a danger that is common, I believe, to all hybrids, untill long cultivation has fixed their peculiarities. Whether the variety of rows that the different ears assume is any indication of a relapse, the experimenter must judge for himself. I have full confidence in the article, and believe it a great acquisition to the garden and the farm.

W. CLIFT.

Stonington, Ct., January 17th, 1853.

FOR THE PLOUGH, THE LOOM, AND THE ANVIL.

OBSERVATIONS ON REARING POULTRY.

BY CHAUNCEY GOODRICH.

MESSRS. EDITORS:—In a former communication I submitted some general remarks on the subject of raising poultry. In that article I gave a condensed statement of the different soils, departments, and fixtures requisite for the successful propagation of the hen fowl. I now purpose to notice the general

management and peculiar treatment indispensable to an abundant, healthful, and prosperous supply of that valuable species of stock-growing; and for the sake of convenience shall arrange my remarks under the following general heads: *Management and Treatment.*

1. **MANAGEMENT:** By which is meant—1. Proper attention to the selection of breeds. 2. The age to which the fowl is to be restricted for use. 3. The seasons of the year for the propagation, respectively, of layers, breeders, and fatlings. 4. The kinds and quality of food. 5. Change of association.

2. **TREATMENT:** By which reference is had—1. To the temperature to which the fowl is to be subjected. 2. To the quantity of food, time and mode of feeding. 3. To the cure and prevention of disease.

BREEDS.

Observation has proved that a promiscuous mixture of several species produces better layers than can be obtained by any selection of distinct breeds; and that the vigor and healthfulness of the entire stock are thereby promoted. Some objection may appear at first view to this mode, as having an unfavorable bearing upon the other purposes for which the fowl is raised. But experience has shown that no such grounds of objection exist. If it be desired to produce a stock for fattening, the eggs of the species best adapted to that purpose may easily be distinguished, and selected accordingly. And it is well known that no distinct species produce uniformly good breeders; but on the contrary, that but comparatively few individuals, in any distinct breed, are good setters, or good protectors of their offspring. The true method, in this particular, is to select from experience and observation, upon the ground of individual manifestation, and without reference to particular breeds. As to the hardihood and health, two very important requisites, it is a well-established fact, that the general favorable effects in this respect are as fully accomplished by the crossing of breeds in the stocks of fowls, as in others of the animal tribe. The promotion of the several objects for which this article of domestic use is produced, seems to harmonize with the practice of a promiscuous mixture of species; the paramount object of *good layers* taking the lead. But whether this generally favorable effect has its origin in the mental dispositions, animal sympathies, or the compulsory influences existing, I leave for the learned and curious to investigate. The facts, under whatever philosophical view they may be taken, remain essentially the same, both in truthfulness and practical importance.

AGE.

Few breeds prove to be good layers much beyond the age of from one to two years; while on the contrary good breeders may be kept, with increasing benefits, from three to six years. When, therefore, a good breeder is discovered, she should be preserved for that object. Fowls for fattening prove most profitable when permitted to reach their fullest maturity of growth, (which may be accomplished under proper treatment in from four to six months,) the most marketable while they are yet young and thriving, which under certain kinds of treatment may be extended from twelve to eighteen months.

SEASONS, ETC.

Late broods, grown principally during winter, produce the earliest and most constant layers. In fact, there is no good reason for introducing early broods for any purpose; as during late winter, throughout spring and early summer, eggs are not only the most merchantable, but command, during those seasons, prices which render their sale far more profitable than brood-raising; while

in midsummer the egg is less merchantable, but more certain and appropriate in its appliance to brood-raising. Besides, late summer and autumnal broods produce, under proper treatment, by far the most hardy stocks. Hence the proper season for raising the respective stocks coincide.

FOOD.

The demand for proper food varies according to the purpose for which the fowl is designed. If exclusively for layers, a very large proportion of animal and mineral substances are requisite, and of each a great variety. If the soils adopted be of sufficient variety, the necessary sources for animal and mineral supply will need no other attention than what may be necessary to render them available. A variety of vegetable food is also necessary. This may be furnished by a mixture of the several English grains, and the addition of the cultivated grasses; also cabbage and some of the minor seeds, such as millet, broom-corn, and sun-flowers.

Fowls for fattening need no other food than that which promotes growth and flesh. Those best adapted to these purposes are believed to be Indian corn, cabbage, and the grasses.

ASSOCIATION.

The practice of an intelligent exchange of companionship is required by a variety of circumstances, many of them founded on the nature and wants and peculiar relationship of the sexes, as well as the different uses and purposes to which the fowl is to be applied. Frequent change of association is particularly necessary in the management of layers; such as new incitements to copulation, and seasonable counteraction of a premature disposition to set. In fact, there appears to be a kind of emulation inspired by frequent change of associates. Again, it is obvious that fatlings, breeders and their broods, should each have separate apartments, with little or no association with the general stock, after the period at which their uses shall have been assigned. Even layers should have separate apartments, and be subjected to periodical change of association. Practice has shown that a judicious exchange is one of the most essential means of success in producing constant layers, as well as in remedying many unfavorable contingencies to which the propagation of fowls is subject.

In a future communication, I shall treat further on the subject of rearing poultry.

FOR THE PLOUGH, THE LOOM, AND THE ANVIL.

THE VALUE OF STRAW.

Nor until quite recently have I learned that straw possesses so much value as a food for cattle and horses. Barley straw seems to be nearly, if not quite, as valuable for feeding young cattle as clover hay. In fact, many are of opinion that it is even of more worth than clover hay. From a recent trial in using barley straw, I am well convinced that it is of much real value; and that farmers—particularly those who raise much barley—should be careful to preserve all their straw, since hay and grain have become so high in our home and city markets. To prove its value, you want to take particular pains in cutting your barley at the right period of its growth. This season, we cut ours when many of the stems or stalks were in a green state. The weather was fair, and no rain, of any amount, was allowed to dampen the cocks and winrows. We cut the barley low, and in order to do this, we rolled our ground thoroughly, with a large roller, immediately after sowing. This process

produced a smooth surface, and hence we were enabled to get all of the barley without running the risk of raking up stones, &c., in the windrows.

As soon as it became dry, the barley was immediately drawn into the barn, and not "stacked," as is often the case when barn room is not plenty. On threshing it, we had a scaffold so arranged that the straw could be taken from the end of the separator and cast into a large bay, reserved for the preservation of the fodder. Thus managed, straw can be fed out at pleasure, just as you would feed out hay to your cows and sheep. I never did like the operation of stacking straw when it was possible to put it up in bays or other suitable places. Most usually, when it is stacked out, the top of the stack becomes deeply frozen, and is, therefore, hard to be got at. Though straw can be stacked in such a way that it will save very well, yet after all, much of it inevitably wastes by reason of the constant access of the cattle to the stack.

The practice of economy in the feeding of straw is just as essential as the performance of it in anything else: therefore it is well to have suitable racks in your yards in which to place the straw. Probably cheap and simple ones would answer just as valuable a purpose as more costly structures.

So far this winter, we have simply used a long board structure, around which the cattle can assemble, and commence grinding up the straw immediately on its deposition in the rack. Frequently, the straw should be salted moderately, for, as almost every body knows, animals are very fond of saline matter.

We have not fed our young cattle on anything except barley, oat and wheat straw for the past two or three months, and I can assure the readers of *The Plough* that they look as fine and sleek as those that have taken plentifully of hay and stalks.

Then, farmers, don't burn up your straw on the fields from which it was taken, as many have done and continue to do, but on the contrary, save it all; feed it out as you would your timothy hay, and my word for it, you will be more than doubly paid for your labor and trial.

W. TAPPAN.

Baldwinsville, N. Y., Feb., 1853.

NEW BOOKS.

The Eclectic German Reader: consisting of Choice Selections from the Best German Writers, with copious References to the Author's Grammatical Works; to which is added a Complete Vocabulary. By W. H. WOODBURY. New-York: Leavitt & Allen, 27 Dey street. 1852. 1 vol., 12mo, pp. 280.

This volume, of which we give the title in full, is a valuable and admirable selection for the use of students of the German language. The book gives numerous references to the author's Grammar, in which the syntactical and idiomatic expression and construction are made familiar and intelligible, in a manner superior to that of any author with whom we are acquainted. We commend the work as a most excellent one for the use of German readers and learners. It is a handsome volume, tastefully printed on fine paper, and clear type.

Japan: An Account, Geographical and Historical By CHARLES MACFARLANE, Author of "British India," "Life of Wellington," &c. New-York: George P. Putnam & Co., 10 Park Place. 1852. 1 vol., 12mo, pp. 365.

The author of this work furnishes his readers with a carefully condensed and prepared account of Japan, from the earliest period of European intercourse to the present time, bringing in review the American Expedition to that interesting country. The author has placed the public under obligations to his pen for the service he has thus rendered. The work is attractive, valuable, and rich in information, and will be sought as the text-book.

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of reference in regard to the history of Japan, until some more favorable time, when the literature of that empire shall become accessible to Europeans. The customs, institutions, history, resources, wealth, literature, and religion of the Japanese are presented in pages pictorial and descriptive, and tempt the curiosity of the reader to break over that wonderfully conservative system which has preserved them so long from change and invasion.

A Shorter Course with the German Language. By W. H. WOODBURY, author of "The New Method," &c. New-York: Leavitt & Allen, 27 Dey street. 1852. 1 vol., 12mo, pp. 230.

This Shorter Course is an introduction to the study of the German tongue. The method is substantially like that adopted by Ollendorff, with which the name of the latter has become identified. There are features in Woodbury's Course which give it a superiority in our estimation over that of Ollendorff for popular use. The method is progressive and simple, leading the learner step by step into an accurate and extensive acquaintance with this difficult language. To those who are studying, or purpose studying, German, we cordially recommend Woodbury's works.

The Schoolfellow. A Magazine for Boys and Girls. New-York: C. M. Saxton, 152 Fulton street.

We have examined with much pleasure the proof-sheets of the forthcoming number of this excellent juvenile work, the publication of which has just been transferred from Charleston to this city. The fifth volume of this publication has just commenced, under very favorable auspices, having already acquired a high degree of popularity as one of the best juvenile magazines in the country. It is *original* in its character, devoted to the cultivation of the heart as well as the training of the mind, and very beautifully embellished with fine engravings. It is edited by Mr. W. C. Richards and "Cousin Alice," (Mrs. A. B. Neal,) and sustained by a goodly number of favorite writers. This magazine is published at one dollar per annum; five copies to one address, \$4; ten copies, \$7; thirty copies, \$20; and fifty copies, \$30.

Fun and Earnest. By the Author of "Musings of an Invalid," "Fancies of a Whimsical Man," etc. New-York: John S. Taylor. 1853.

Those of our readers who have read the former volumes by the same writer, will not fail to anticipate a rich satirical treat in the perusal of this. "Fun and Earnest" contains all the pith and sarcasm of the "Musings," with a very decided and successful *hit* at some of the ultraisms of the present day. Pungency, irony, and wit characterize the present volume; and the reader will recognize some very appropriate and significant allusions to matters connected with every-day life in New-York. The polished shafts of satire, well directed, have done much towards correcting and reforming many of the follies and extravagances incident to the varied pursuits of life; and in the present instance, the grotesque quaintness of the author, while it will exceedingly amuse the reader, is nevertheless well calculated to produce a beneficial effect upon the prevailing tendencies of the age.

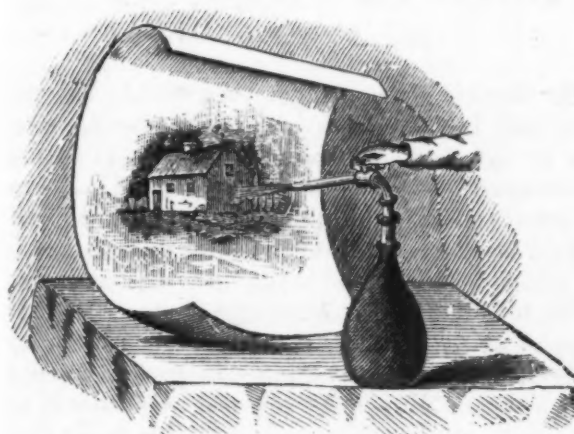
Ladies' Keepsake and Home Library. New-York: John S. Taylor.

This beautiful monthly continues to elicit high encomiums from the press generally, and we consider it among the best publications of the kind now before the public. While its pages abound with a rich variety of matter, they contain nothing repugnant to rational piety, pure taste, or true delicacy. Its embellishments are of a high order, and its low price (\$1 per annum) ought to place it in every family in the land.

Stephens's Book of the Farm.—We need scarcely detail the excellence of this agricultural work. The best farmers are aware that it is one of the most unique and valuable books within the range of agricultural literature. It gives an accurate digest, as ascertained by observation, experiment, and experience, of the labors of the farmer, ploughman, shepherd, hedger, cattle-man, field-worker, dairy-maid, and practical students in general. The business matter of the farm is divided into four parts, bearing the names of the four seasons, wherein are treated all the operations connected and performed in them. It is especially adapted to American farmers, by explanatory notes, remarks, &c., by JOHN S. SKINNER; while the typography and illustrations are worthy of the contents. Saxton, Publisher, New-York.

THE HOME CIRCLE.

APPLICATIONS OF CHEMISTRY FOR FAMILIES.



CHEMISTRY and electricity are profitable studies, because they bear upon the interests of almost every pursuit or pleasure of life. But it is not often we have seen both illustrated for juveniles and the family circle with a more elegant simplicity than in a publication called the "School-mate," published by George Savage of this city. The style is delightfully clear, and the subjects are brought to bear on the attainment of know-

ledge and amusement. The following remarks taken from its pages show a specimen of science devoted to ornament:

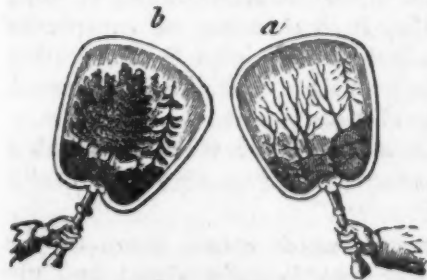
"Some of our readers may already understand the art of writing invisible letters to each other, which can only be read by exposing them to the fire, or to some kind of gas.

A solution of the *nitrate of bismuth* forms an invisible, or, as it is sometimes called, a *sympathetic ink*. Letters written with it, though at first invisible, will, when exposed to *sulphuretted hydrogen gas*, become black, so that they can be easily read.

Solutions of *nitrate of cobalt* also form this ink; when pure, it generally appears of a beautiful blue color. The writing is invisible on white paper while it is cold, but takes a blue or green tinge when exposed to heat.

Sometimes acetate of lead, or even skim-milk, is used for this purpose. Young ladies would find it a very interesting amusement, and would fill their younger brothers and sisters with wonder and pleasure, by making invisible pictures with this substance, and then suddenly making them appear, in the following manner:

Suppose a sketch to be made, like the above cut, with the *acetate of lead*, which is colorless, and this sketch to be exposed to the action of a stream of *sulphuretted hydrogen gas*, the lines will become black as if made with a lead-pencil, and a complete picture will appear to have sprung into view in an instant. The lead, combining with the sulphur of the gas, has formed sulphuret of lead, which is black.



THE MAGIC FIRE-SCREENS.

Many beautiful and scientific ornaments may be formed on this principle. Paper fire-screens are often used to shield the face from intense heat. These may be adorned by drawings of trees, whose trunks and leafless branches should be sketched with a lead pencil, India-ink, or, if necessary, in other appropriate

colors, forming a winter scene as represented at *a*, and the foliage made with the invisible solution of cobalt.

As long as the screen is laid away in a cold place, it shows nothing but a dreary winter; but whenever it is used, and brought near the fire, the green leaves at once appear, and spring returns, as at *b*. Instead of explaining the causes of these changes, we advise you to look to your Chemistries."

HINTS ABOUT HEALTH.—The ancient Romans gave rewards to citizens who brought up large families, and healthy children were considered a contribution to the effective force of the state. Who can doubt that measures for the *preservation* of health are equally deserving of encouragement? There is no absolute necessity for so much suffering and disease, but there are in all communities persons who neglect cleanliness in their houses or persons; who live in damp or ill-ventilated houses, and eat and drink unwholesome food, regardless of consequences. We hear it said that if the noxious particles that rise from vitiated air were palpable to the sight, we should see them lowering in a dense black cloud above certain haunts, and rolling slowly on to corrupt the better portions of a house or town. But if the physical pestilence is so dreadful, so must be the moral pestilence, for they are inseparable in the immutable laws of nature. Let any mother who confines her children in a bedroom breathing stagnant air, try the experiment of breathing her own breath over again for a few minutes, and she will never be guilty towards her children again. It has been proven by statistics taken in various countries that scarlatina and other infectious diseases invariably hunt out ill-ventilated houses, and when once in, they are almost sure to inoculate all the occupants; and the poisoned air entails the disease on many who have the temerity to enter.

WINTER CLOTHING.—Winter is the season of warm garments. The dry-goods stores now, instead of displaying muslins, gauzes and laces, unfold woollens, furs, cloaks, hosiery and blankets. Winter is the time to mind the feet, for health depends on keeping them comfortably warm. The blood must circulate to the extremities and the nerves of the skin, and for this reason we recommend woollen stockings. Even silk is warmer than a cotton stocking, because silk is a non-conductor of heat. Fine, light, or lamb's wool, are much better than worsted, and the texture should be rather loose than close. A piece of brown paper cut to the proper size and shape, and worn inside the sole, takes scarcely any room in the shoe, and adds greatly to its warmth. A sole of cork inside the shoe is comfortable and useful. Woollen gaiters are also a great protection. Elderly people, or those liable to rheumatism, will find comfort from woollen knee-caps. Flannel next the skin is a great preservative against cold. It is not merely a non-conductor of heat, but acts as a stimulus to the skin, and assists it in throwing off superfluous matters. The celebrated John Hunter gave these three rules for the rearing of children: Give them plenty of milk, plenty of sleep, and *plenty of flannel*. In short, flannel is a most important article of dress for either sex, for infancy, meridian, or old age. Let all ladies at this season furnish themselves with a good supply of flannel and merino petticoats, and not sacrifice their health to the vanity of displaying slim figures.

UNFERMENTED BREAD.—Bread is a matter which comes home to the stomachs of every body, and we would say a word on fermented and unfermented. Bakers generally make fermented bread. The only purpose served by fermentation is the generation of carbonic acid to raise the dough,

and to effect this, a quantity of yeast is mixed with the flour. But the same purpose is gained by mixing a quantity of carbonate of soda with the flour, with a corresponding proportion of muriatic acid, and bread so produced is more nutritious and economical. The following formula is for *White Bread*:

Take of flour, dressed or household, 3 lbs. avoirdupois; bicarbonate of soda, in powder, 9 drachms; hydrochloric acid, specific gravity 1.16, $11\frac{1}{4}$ fluid drachms, and about 25 fluid ounces of water.

TO MAKE BROWN BREAD.—Take of wheat meal 3 lbs. avoirdupois; bicarbonate of soda, in powder, 10 drachms ap. wt.; hydrochloric acid, same specific gravity as for white bread, $12\frac{1}{2}$ fluid ounces, and water about 25 fluid ounces. First mix the soda and the flour as thoroughly as possible. This is best done by shaking the soda from a small sieve over the flour with one hand, while the flour is stirred with the other, and then passing the mixture once or twice through the sieve. Next pour the acid into the water, and diffuse it perfectly by stirring them well together with a rod. Then mix intimately the flour and the water so prepared, as speedily as possible, using a wood spoon for the purpose. The dough will make two loaves somewhat larger than two pound ones as sold by the bakers. They should be put into a quick oven speedily. By this method bread can be made in two hours, and saves both time and labor. The ingredients are simple, and cost little. This kind of bread never sours on the stomach. Fermentation always destroys more or less of the meal.

LIFE.—Every day is a little life, from which we may reckon our birth from the womb of the morning; our growing time from thence to noon, after which we hasten to the evening of our age, till at last we close our eyes in sleep, the image of death; and our whole life is but a tale of a day told over and over.

MENDING CHINA.—The best cement for broken china or glass is made by soaking isinglass in water till it is soft, and then dissolving it in proof spirit. Add to this a little gum, dissolved in as little alcohol as possible. When the cement is to be used, it must be gently liquefied by placing the phial containing it in boiling water. The phial must be well closed by a good cork, not by a glass stopper, as this may become fixed. It is applied to the broken edges with a camel's hair pencil. When the objects are not to be exposed to moisture, white of egg alone, or mixed with finely-sifted quicklime, will answer pretty well. Shell-lac dissolved in spirits of wine is better. A very strong cement for earthenware is made by boiling slices of skimmed milk cheese with water into a paste, and then grinding it with quicklime in a mortar, or on a slab with a muller.

LUNGS AND STAYS.—A work recently published thus talks of the fatal consequences of bad air and pressure: Women ought to measure at least from 27 to 29 inches round the waist, but most females do not permit themselves to grow beyond 24; thousands are laced down to 22, and some even less; and thus by means of wood, steel, and whalebone the lungs are injured, a weak and miserable progeny is engendered, and an early death secured.

WOMAN.—He who has not experienced the friendship of woman, knows not half the charms and delights of friendship. Woman possesses the art of embellishing the saddest moments of our life, by unalterable sweetness of temper, constant care and unwearied attention; she is man's best companion in prosperity, and in adversity his truest friend. Without her society our existence were a blank, our life barren, cheerless and comfortless as the wilderness.

AGRICULTURAL RECORD.

THE ESPIRITU SANTO.—A Panama paper describes this to be one of those rare flowers found only on one part of the Isthmus, near Panama. It is of the lily formation, possessing a bulb root, long oval leaves, and a stock three or four feet in length. It requires little earth for vegetation, growing among stones with the bulb entirely exposed. The flower is of the most elegant formation. The outward part, which is smaller than a pigeon's egg, resembles a curious shaped vase, on opening the lid of which the most perfect and beautiful *fac-simile of a dove is found within*. The head is turned over its back, appearing as if about to soar into the regions above. It is the most extraordinary flower ever seen, while its beauty and curiosity is said to excite the admiration of all beholders. We trust some spirited individual will forward one or two to this part of the world for exhibition.

NEW DAHLIAS.—The following notes concerning the best new dahlias brought out in England during the past year, will be interesting to our horticultural readers:

Sir John Franklin. (Turner's.)—This flower is, by many, thought to be the best seedling of the year. It is an orange buff. It has taken several prizes against very large collections of seedlings.

Unanimity. (Edward's.)—This is a beautiful flower. Flaked like a carnation in stripes; scarlet and yellow. The best of its class in form and petal.

Lilac King. (Rawling's.)—Exquisite Lilac; perfect centre; very fine shape; some say the best of the season, and universally admired.

Miss Matthews. (Bragg's.)—Scarlet, edged with white; remarkable for its depth of petal.

Miss Caroline. (Brettell's.)—Blush white-edged purple. In the way of Marchioness Cornwallis, but better. Centre close and good.

Lord Byron. (Pope.)—Rosy salmon; color novel; large smooth petal, and good shape.

Beauty of the Grove. (Burgess.)—Buff yellow, with rosy tip; deep flower and showy.

Brilliant. (Rawling's.)—Vivid scarlet; splendid form; good centre. Best scarlet yet raised.

WATER IN FLOUR AND WHEAT.—Prof. Beck has written a report for the Patent Office, in which he shows that the presence of water in wheat and flour is the reason

why these articles are unfitted for preservation; and also that the total annual loss in the United States from moisture in wheat and flour is estimated at from \$3,000,000 to \$5,000,000. It is said that the quantity of water in wheat is greater in cold than in warm countries. In the United States it is from 12 to 14 per cent.; in Africa and Sicily, from 9 to 11 per cent. The flour of the Southern States yields more bread than the Northern, for this reason; it is said that Alabama flour yields 20 per cent. more than Cincinnati. The warmer the country the more is the water dried out of the grain before it ripens, and hence the more water it absorbs when made into bread. The Hartford *Excelsior*, to remedy the evil arising from loss by flour turning sour and musty, says, "that the grain should be well ripened before harvesting, and well dried before being stored in a good dry granary. Kiln drying is preferable. The mode of ascertaining the amount of water is this: Take a small sample, say five ounces, and weigh it carefully. Put it in a dry vessel, which shall be heated by boiling water. After six or seven hours, weigh it carefully, until it loses no more weight. Its loss of weight shows the original amount of water."

THRESHING MACHINES.—Measures to secure a patent for improvements in threshing machines have been taken by Thomas McClure, of Ohio. These improvements prevent the grain from being thrown out of, or beyond the machine, by the force of the threshing cylinder, and allow of the straw being discharged or drawn from beneath the curve or deflector. This deflector is of a peculiar shape to supersede the ordinary method. There is also a peculiar arrangement of the spouts, by which the grain is perfectly separated from foreign substances.

COTTON SCRAPER AND CULTIVATOR.—I. W. Thompson, of Jackson, Tenn., has taken measures to secure a patent for a combination of these two agricultural implements. The cultivator is attached behind to the standard of the scraper by means of a staple, or other fastening, dispensing with the beam and handles as unnecessary. Economy of labor results from this combination of two distinct implements, as the two operations of scraping and ploughing the ground are performed together, the teeth of the cultivator taking into the ground and cutting it loose as the scraper clears it off.

LONGEVITY OF FARMERS.—The Massachusetts registry for 1851 establishes beyond all cavil, that agriculturists stand much the highest chance of long life. Farmers' lives run up twelve years above the general average, nearly nineteen above that of common laborers, and eighteen per cent. above the average age at death of mechanics. All countries confirm the fact that agriculturists enjoy the longest lives. The statistics of every country show that agriculture is a more healthful, pleasant, and safe pursuit than any other. There is not a profession, or artisan or mechanical business in this city, in which there are not hundreds living in care, want, drudgery, and hastening to early graves, who, had they been farmers, would have been healthy and happy, if not wealthy.

NUMBER OF PLANTS PER ACRE.—The *Western Horticultural Review*, a first rate monthly, by the way, published in Cincinnati, gives the following table as useful to the gardener, in showing the number of plants or trees that may be raised on an acre of ground, at given distances apart, when planted at any of the under-mentioned distances:

Distance apart.	Number of Plants.
1 foot, - - - -	43,560
1½ feet, - - - -	19,360
2 " - - - -	10,890
2½ " - - - -	6,969
3 " - - - -	4,840
4 " - - - -	2,722
5 " - - - -	1,742
6 " - - - -	1,210
9 " - - - -	587
12 " - - - -	306
15 " - - - -	193
18 " - - - -	134
21 " - - - -	98
24 " - - - -	75
27 " - - - -	59
30 " - - - -	48

AMERICAN INSTITUTE.—The Farmers' Club, at a late meeting, had exhibited a specimen of the Japan pea, the plant of which grows to the height of 4½ feet. Fine specimens of potatoes, apples, and grapes, from P. Phillips, Conn., Judge Livingston, and Mr. Coleman, M. D., were presented to the Club, and also cakes of preserved vegetables, beans, cabbage, &c. &c., put up by Challot & Co., of Paris, all of which elicited the complete approbation of those present. Judge Meigs introduced to the meeting Mr. W. M. Abbott's solidified milk, which is intended as a substitute for ordinary milk on long voyages at sea. A practical illustration of the qualities of this preparation was given in conjunction with some excel-

lent coffee, and the result of the experiment appeared to give general satisfaction to the Club. The cost of this solidified milk is 50 cents per lb.; no estimate, however, of its cost by quantity, in comparison with pure milk, was given.

TANNING.—The Hon. Zadock Pratt, in a lecture at the Mechanics' Institute, in this city, spoke of the tanning business, which he said he had pursued during the last half century. During this time he had tanned sufficient leather to make a pair of shoes for every man, woman and child in the Union. If he had not given them souls, he he had at least furnished them with an *understanding*; and he might claim that he had manufactured *two soles* for the greater part of our population. The subject of Tanning has, he said, claimed but very little attention in proportion to what has been bestowed upon various other subjects. *Tanning* and *Leather* are old words, known in ancient languages. In ancient times tanners were considered an important class of men. There were then seven different processes of tanning. He hoped that chemists and other scientific men would turn their attention to the subject of tanning, and that new discoveries would be made in the art. To a practical tanner, the first thing essential is a good location—a place where is to be had a good quality of hemlock or oak bark. Water-power is another advantage to be secured, unless steam-power is to be employed. There must also be a facility for transportation, so that hides can be procured readily, and leather transmitted to market at no great disadvantage. It is more feasible to transport hides to the bark than bark to the hides. That part of the city of New-York known as the "Swamp," lying between William and Pearl streets, and intersected by Ferry, Frankfort, Cliff, Gold and Spruce streets, was spoken of. Formerly much tanning was done there, but it has changed to a leather market, and morocco-tanning only is continued. It is the greatest leather market in the world, and as a locality is as well known as Wall street.

In selecting a location for tanning, it is requisite to purchase land which, when cleared, will be of value. A saw-mill should be convenient to such a tract of land, where the logs from which the bark is stripped can be converted into lumber. On such a feasible tract of land, with good workmen, an employer can establish a prosperous community. Since the time when he learned the tanning trade of his father, the lecturer had been engaged in the business, and had witnessed all the im-

provements in that art since the time of the death of Gen. Washington. Mr. Pratt said he had more confidence in his experience than in what he had read. He noticed various improvements which had been made from time to time. He established tanneries at Prattsville in 1824; and by his belief that "To will and to do are nearly the same thing," he had met with success. When the first hemlock-tanned leather was taken to England from the United States, it excited surprise; and an English chemist insisted the hides were not tanned,

but that they were colored, and he would extract the coloring matter. *He tried it and failed!* "Chemists," Mr. Pratt said, "should turn their attention to the subject of Tanning, as he believed that much economy could yet be established in the use of bark, by a better knowledge of its properties. The capital already employed in the business in this country was \$19,000,000, and some \$20,000,000 of raw material is annually worked up. Twice this amount may be now invested in the business, could more economy in its process be obtained."

SCIENTIFIC AND MECHANICAL MONTHLY RECORD.

IMPROVED CAR WHEELS.—John Eaton, of Brownsville, N. Y., has taken measures for a patent for an improvement in the casting of railway wheels, to prevent them breaking from the contraction of the metal in cooling. To accomplish this, the space between the centre or hub of the wheel and its periphery is formed in a series of spiral curves, which transversely take a zig-zag shape, so that the wheels are prevented from breaking as they contract in the cooling process. To prevent any excess of metal at the periphery, provision is made for a hollow truck or recess, extending all around the wheel and connected with the ends of the spiral curves, which also forms part of the casting.

BREAD CUTTER.—W. R. Goulding, of New-York city, has invented a simple machine for this purpose, which consists of a knife that can be adjusted to suit any thickness of bread required to be cut, and a guide-bar connected to it by means of screws. These screws adjust the knife to any required width, and are fastened to the ends, and pass through the ears and projections of the guide-bar, which are tapped to receive them. When a person wants a thick or a thin slice of bread, he turns the screws to the right or the left, and the variation takes place.

METHOD BY WHICH THE EYE JUDGES OF DISTANCES.—The *London Art Journal* says, that many opinions have been at various times advanced relative to the determination of proximity or remoteness of objects from the eye, but the most plausible hypothesis seemed to be that some time ago suggested by Hermann Meyer, of Zurich, namely, that proximity of an object was determined by divergence of the two optic axes. The reflective stereoscope has demonstrated the correctness of M. Meyer's hypothesis. If after having placed the two pictures in the

stereoscope in such a manner that their centres correspond, and when, consequently, one single image in relief appears, the two designs be drawn simultaneously towards the eyes, the dimensions of the image in relief seem to grow less. If, however, the two designs be simultaneously removed from the eyes, then the image in relief seems to grow smaller than before. Now it is obvious that the convergence of the two optic axes increases in proportion as the two screens are brought near to the eyes, and decreases in proportion as they are removed.

GOLD IN VERMONT.—We find the following interesting correspondence in the *Vermont Chronicle*, which shows that we have the auriferous metal nearer our own doors than either California or Australia: "Prof. Hubbard showed me to-day several specimens of gold found in Bridgewater, on the Quechee River, (or one of its branches,) about four miles above the village. He has not visited the locality himself, but received the information from Mr. Kennedy of Plymouth. The specimens are not washings, but from a vein. The gangue, or rock in which the gold lies, is quartz, containing also considerable sulphuret of iron, sulphuret of lead, and sulphuret of zinc, particles of gold being found in these, as well as in the quartz. What quantity of this ore exists there, that is, what quantity of auriferous quartz and sulphurets, the information does not state, but these specimens are worth working; and if the vein is extensive, gold might be expected from washing the sands of the Quechee. As the existence of a gold formation in Vermont has been known for several years, it is a little singular there is no more interest taken in the subject by the people of the vicinity. If any doubt the existence of gold there, an inspection of these specimens will satisfy them."

OCBRE IN VERMONT.—The following is from the same authority as the above: "Prof. Hubbard also showed me several specimens of ochre of various colors from Strafford—a new and interesting discovery. It is no other than taking the spent ore of the copperas works, and subjecting it to various degrees of heat; the result when pulverized is pure ochre, varying in color according to the degree of heat. The copperas ore is a sulphuret of iron. The sulphur being extracted, which makes the copperas, the residuum being heated becomes an oxide of iron, otherwise ochre. From this, by a refining process very simple and at small expense, is obtained the pigment,—bright red, pale red, brown, and various hues of yellow.

"Whoever has visited the Strafford copperas works has noticed the immense mounds of sweltering ore, which, by repeated applications of water, lasts for years to supply the vats where the copperas is crystallized. New ore is occasionally added as the mound loses its sulphurous element. When any portion is entirely deprived of this element, it may forthwith be converted into a pigment. The company therefore have at their hands, in their own yard, and in their way as a nuisance otherwise, material enough for a great supply of this article; and when this is exhausted, they have ten thousand millions of cart loads more in the mine hard by. And so there are inexhaustible mines of ochre in Vermont; for this formation extends from Strafford to Shrewsbury, at least."

MOTIVE POWER.—Antoine Maurice Tardy De Montravel, of Paris, has taken out a patent for certain improvements in obtaining motive power, and the machinery employed therein. He claims a system or mode of obtaining motive power by the alternate application of heat and cold to atmospheric air, or other gases, permanently inclosed in a cylinder or other suitable vessel; the use and application of liquid or semifluid matters, between the atmospheric air and the piston; and the arrangements of the machinery. The grand object is the obtaining motive power by means of atmospheric air or some suitable gas compressed in a cylinder by means of an air-pump. The cylinder contains a piston working both ways, and which is worked by the alternate expansion or condensation of the air or gas within the cylinder. This expansion or condensation is produced by the alternate application of heat and cold to the exterior of the cylinder. The motion of the piston is made to operate upon a crank, or any other suitable means for obtaining power. To render the piston air-

tight, in the place of the ordinary packing, the following system is pursued: at the point where the packing is usually placed, a vacant space surrounds the piston-rod, which is filled with water or grease, soft clay, or any suitable semifluid matter. The patentee describes another method of obtaining motive power by means of a piston partly filled with water, which water is propelled against the piston by the expansion of warm air contained within the cylinder.

ORNAMENTATION OF GLASS AND CHINA.—A patent has been obtained in England, by John Ridgway, for improvements in the method of ornamenting articles of china, glass, earthenware, and ceramic wares generally. The method or process is not by solutions for coating, but by the application of electro-typing, or electro-metal-lurgy to the objects, provided they are so prepared as to allow them to combine from an alloy with them. The first object of the patentee is to apply a new glaze which shall enable the metallic coating to adhere firmly, by capillary attraction, and give affinity for copper as a first coating. In pursuance of this, the article is first submitted to an alcoholic solution, or a gelatinous solution, and then brushing over it an impalpable powder, composed of half carburet of iron and half sulphate of copper. The article thus treated is then to be corroded by the fumes of hydro-fluoric acid; and is then to be smoothed, by brushing it over with silver sand, or by the scratch-brush; but when the shape and nature of the article will not admit of this, it is to be plunged into a liquor, consisting of 6 quarts sulphuric acid, 4 quarts of aquafortis, $\frac{1}{2}$ oz. muriatic acid, and 6 quarts of water. Grease is to be carefully removed from the article, and a thin film of mercury is to be applied. The solution of copper consists of 1 sulphate of copper and 4 filtered water. Suitable solutions for silvering or gilding are to be applied, in accordance with the practice of electrotyping.

MANUFACTURE OF GLASS.—A Staffordshire manufacturer, England, has made some improvements in the manufacture of glass, which he has patented. These consist in the application of anthracite coal in the manufacture. The fuel hitherto used has been for the most part bituminous coal, but this evolves so much smoke as to produce an injurious effect on the color of the glass manufactured; and it is with a view to prevent or obviate such injurious consequences that the present improvements have been devised. The furnaces for burning this description of fuel require to be

very little altered from the construction at present in use. The fuel will be supplied by feed apertures, and suitable pipes must be added for introducing a blast of air, which blast may be created by fan or other blowers. The air may be heated by interposing a suitable heater between the blower and the furnace, but the heating is not considered necessary. The beds of the furnaces should be closed, which may be done by "loaming" over the grate bars, or by introducing a movable plate beneath them; and the ash pit should be made deep enough to contain a considerable quantity of ashes. The pots are of the usual construction, and they should be placed on sieges elevated above the orifices of the blowing pipe to an extent that will admit of the flame being directed against the lower as well as the upper parts of the same.

NEW METHOD OF ROOFING.—We find from the *London Morning Chronicle*, that a patent has been granted to Mr. Cowper for improvements in coverings for buildings, by means of tiles, or plates of sheet iron, rendered applicable for that purpose by coating it with an enamel or composition capable of enduring and protecting the metal from the weather. It is well worthy of notice in our own country. Tiles, according to this manufacture, may be of any suitable form; or ornamentality is combined with utility. The English press say, that the body of the tile, which is of thin sheet iron, is cut or stamped of the proper shape. It also has a raised head formed round the edge, to prevent the water from running off the tile, with the exception of the lower end, where it drops on the next. Two holes are also punched for fixing the tiles to the wood-work. The upper or narrow end of the tile is bent at right angles, which is introduced in an opening between supporting laths or strips of wood. The hook, or right-angled portion, sustains the tile, while two nails, introduced at the holes, steady and keep it in its place. In lieu of the nails, before referred to, to fix the tiles, the patentee sometimes rivets a hook so as to project on the under side of the tile; the stem of the hook is riveted through a hole in the metal plate before it is enamelled, which, when so coated, is impervious to water, and obviates the necessity of an India-rubber washer under the head of the nail, which is required when fastened by nails through the holes. The coating of these tiles is applied in two separate compounds, the one as the body, and the other as a glue for the surface of the composition. The coating for the body consists of sand or silica; the glue, or second

coating, is applied in the shape of fine powder, which is dusted on the wet coating until the entire surface is covered. The powder adhering to the moist coating causes it to set in some measure, when the tile is deposited in a drying-room, previous to baking or firing. The tiles may be rendered ornamental by the application of coloring matters, according to any design or pattern, which are burnt in, and thereby rendered indelible, as well understood in porcelain manufactures.

FORDER'S RAILWAY FENDER.—An experimental model fender, for deadening collisions on railways, has had a trial in England, in presence of its inventor, A. T. Forder, Leamington, of that country. We extract the following description: "The improved fender consists of two parts, one called the 'striker,' and the other the 'receiver.' The striker is formed of a plate of metal, into which a number of strong bars of steel, of different lengths, are fastened. The receiver is a similar plate with apertures, over which are placed pieces of spring steel, the centres of which correspond with those of the bars in the striker. The two bars are fixed together, so that the latter may slide towards the receiver, and each bar of the striker be exactly opposite the centre of its antagonistic steel plate. One fender is intended to be fastened to each end of every carriage. As the striking bars are of different lengths, and project from the plate, the centre part of the plate being struck, the bars will successively bend and break its opposing steel plate; and, if there are a sufficient number of them, the fender will absorb the whole of the impelling force, and, in case of a collision, stop the train without injury to passengers or carriages, inasmuch as the whole of the blow will have been expended in breaking the plates.

"The working model exhibited on Saturday consisted of a railway 5 feet high at one end, and 3 inches at the other, being 30 feet in length, and forming an inclined plane or fall of 1 in 6. Upon the highest position of the rails were placed two carriages fitted up with glass windows, and in all respects similar to first and second-class railway conveyances. At the end of each was appended a model fender of the above construction, and upon a given signal the train, each carriage of which weighed about 60 lbs., ran down the rails against a block placed at the bottom. The result of the collision or blow was, the plates in the fender were nearly all broken, while the carriages remained perfectly uninjured. There was no perceptible recoil, and the train was brought to a dead stand in an instant."

PATENT IRON CASKS.—The Liverpool papers describe the testing of some patent iron casks, which promise to supersede wooden ones. The dimensions of one cask tested were: 38 inches diameter of head, 43 inches diameter of bilge, and 42 inches length of stave. It was found to hold 214 imperial gallons, while an ordinary wood cask would contain only 150 or 160 gallons. When full it was rolled freely over flags and pavement, and found tight and strong. It was afterwards lifted from the ground and suspended by ordinary cant-hooks fixed in the chime ends. As timber becomes scarce, this invention is an object of special interest and importance.

AMERICAN PLANING MACHINE.—The London *Mechanics' Magazine* says: "Several packages have arrived at Liverpool by the mail steamer *Atlantic*, from New-York, containing articles forming together an American invention for a planing machine. It has been brought over to this country from the United States for the purpose of exhibiting and submitting to competent tests its capabilities, which are understood to be extraordinary, and to obtain an English patent for it. It was intended to have been sent to the Great Exhibition of 1851, in Hyde Park, but the inventor could not get it completed in sufficient time; and it comes now with the same general objects of public utility as in the case of the foreign articles sent to the Great Exhibition of 1851. This newly-invented planing machine is intended to be returned, after a lapse of time necessary for the intended purpose, to the United States."

CIRCULAR SAW.—We learn from the *Albany Press*, that Gen. Crosby, of Chautauque, has invented a circular saw for sawing clapboards and panel stuff, or for splitting plank or boards to any thickness. The process in present general use is cumbersome and slow, comparatively; three hundred feet per hour being deemed fast work. This saw is said to do a thousand feet per hour, straight or bevelled, and in its construction is neat and compact.

JOINERS' NEW MACHINE.—We read that Mr. Dudley, from America, has been exhibiting before the Liverpool Philosophical Society, an improved mode of applying the power of driving-bands to machinery. The principle not only economizes power, but expense in pulleys, belting, and space. He exhibited a model of the machine, with one of which size, he alleged, with a man to turn and a boy to feed, more sawing could be done, of the character generally done in a joiner's shop, than any eight men can do

by the present mode of operation. The machine was also equally applicable to all descriptions of machinery that required rotary motion as it was to the saw. By the present mode of banding pulleys, friction increased in a greater ratio than velocity. By the new method, a saving of three fourths was effected in the friction, and, as friction did not increase with the speed, the saving of power was more apparent and greater the higher the speed or velocity of the machinery; so that, supposing, on driving a spindle by the old method of belting, say at the speed of 1,000 revolutions in a minute, the power consumed in friction was 20 per cent., and to raise that to 2,000 revolutions, upward of 40 per cent. of power would be used, they would, therefore, save 35 per cent.

THE ERICSSON MOTOR, AND THE COAL REGIONS.—Much discussion has arisen to know what effect this new motor will have upon the coal regions, and a writer in the *Philadelphia Ledger* thus answers: "The undoubted effect would be this, viz.: Instead of supplying a hundred steamers, as now, with say 1,000 tons of coal a day, we should be called upon to furnish 5,000 marine vessels, every thing that floats, in fact, with 5,000 tons a day. Besides, the land would be covered with caloric engines. The cheapened power would banish hand-toil, and horse drudgery, and negro slave labor. The grease that keeps one negro would propel a caloric plough of 100 negro-power, and other things in proportion. It is clear that Providence has destined the steam or caloric plough to be the peaceful emancipator of the slave, whom, for purposes not otherwise possible of attainment, the same Providence sent hither and bound to servitude to insure cotton clothing for mankind. As a general principle, our colliers may rely that the greater efficient service can be produced by a ton of coal, the more tons will be required; or in other words, the cheaper a thing is made, the more will it be used, as exemplified in pins, matches, and penny papers."

LIEBIG MEDAL.—A medal of considerable artistic merit has just been issued by the celebrated Ferdinand Korn, in Mayence. It has been struck in honor of the world-known chemist, Justus Liebig. The medal is of a diameter of 20 Rhenish lines. The obverse presents a striking likeness of the great chemist; the reverse presents an allegorical composition, consisting of a number of figures, among which are the personifications of science in general, chemistry, botany and mineralogy. The medal is worthy of the object.

FIRE ENGINE INVENTION.—The corporation of the city of Cincinnati have lately built a steam fire engine, and given it a public trial, at which it appears to have been more successful than Barnum's fire annihilator. The Cincinnati *Times*, describing the experiment, says, that "horses were attached to guide the apparatus, but its own inherent locomotive power is chiefly relied on, the machine weighing several tons, and presenting to the eye, as it goes rumbling along the streets, with its smoke chimney and steam pipe, the appearance of a railroad engine. This giant throws six streams of water by steam power, and works constantly, without much labor; steam can be generated in five minutes, and kept up without difficulty any length of time."

A PECULIAR LAMP.—A Mr. E. Whele (so says a foreign paper) has taken out a patent for a lamp with a dial or clock face, and as the candle burns, the hands mark the hours and minutes correctly, and the hammer strikes the time. As a chamber lamp for a sick room, it can be set to strike at such periods as required. As a night light, it marks the time on a transparent dial, rings an alarm at any stated period, and in ten minutes afterwards extinguishes the light, or will continue to strike every second until the party gets out of bed and stops it. It can also be made to fire off a percussion cap, and by a regulator and index it shows the amount of light consumed. We understand that all this is accomplished with very little and very simple machinery.

NEW STEAMBOAT WHEEL.—The Detroit *Advertiser* describes the trial of an improvement in the paddle-wheels of steamboats, invented by Capt. W. A. Bury, of Michigan. The principle of this invention we understand to be getting rid of much of the lift of water by the revolutions of the wheels, which causes the loss of such a large amount of power on steam-vessels. That Capt. Bury must be on the road to success, must be evident from the fact, that when he tried his model, which is about four feet in diameter, in the water, turning it at the rate of 30 revolutions per minute, he was not wet at the distance of two feet from the paddles. We are informed that the wheel which he has invented is formed in all its parts exactly like the paddle-wheels of a steamboat, with the exception of the paddles or buckets. In the common paddle-wheel the paddle or bucket is a solid oblong board, fastened firmly across the two

parallel arms. In this new wheel a paddle or bucket is affixed to each arm by a strong hinge in the inside corner of the arm the two paddle-wheels being equivalent to one common one. The paddle itself is an oblong piece of wood, shaped like a wedge and hung in the arm, so that the heavy end is between the arms, and the light end is outside. But the lightest division of the paddle-wheel has the most surface, and it is upon this fact the utility of the invention depends.

For instance, the wheel revolves, the paddle-wheel strikes the water, but it is so hung on the arm at a certain angle that the outside corner gradually sinks in, and as the wheel revolves the surface of the paddle meets the water gradually, but so as to press it back against the arm, where it is firmly held by the pressure caused by its own motion through the water; as the paddle rises to the surface, the angle at which it comes out of the water permits the heavy end to fly back against the inside of the arm, and it thus comes out edgewise, exactly on the principle of feathering an oar. The paddle, by the simple operation of the principle of gravitation, remains with its edge directly in the line of the revolution of the wheel till the arm passes the perpendicular, when the paddle falls into its place ready to meet the pressure of the water again.

It is well known that in the revolution of the paddles of our ordinary steamboats, an immense amount of power is lost by having to lift a heavy weight of water with every turn of the crank. Numerous contrivances and inventions have been tried as a means of overcoming and doing away with this useless weight which the boat is obliged to carry; but we know of none that has not been found too intricate to be useful or available.

LIFE PRESERVERS.—A Mr. George P. Tewksbury, of England, has invented a life-preserving seat, which some of the English press highly eulogize. These seats are in the form of stools and settees, and are so constructed that whilst they answer the purpose of ordinary stools and settees, take no more room, and are just as portable, they possess such buoyancy that one stool will easily support one person on the surface of the water, and a settee that will seat three persons will support the same number. It is said the British Government are about adopting them in their ships of war and transports. The same gentleman has also invented a life-boat of the same character, that under no circumstances can founder, sink, or be inverted, unless broken.

EDITORS' JOTTINGS.

THE REALITY AND POETRY OF MECHANISM.—Mechanism is become a very source of inspiration. Among the latest imbibers at its fount is the Rev. Samuel Osgood, who has been lecturing before the members of the Mechanics' Institute of this city, on the "Poetry of Mechanism." In that lecture he contemplated the works of genius as applied to useful pursuits, of its changing the face of nations, taming the wild heavings of nature, and elevating man from the savage to the citizen. Or to use his own words: "Sublime are the processes and results of the mechanic art! Look at iron levelling forests, and subduing waves! What is man without the backwoodsman's axe, compared with man with that axe? Look at this, and see what iron has done in our day. Is bread the staff of life? Twenty acres of land may now be cultivated by the same labor that one required a few years ago. One man and one boy can now do the work that once took one hundred men and one hundred boys to do. More potent than the decrees of Xerxes, the hand of science subdues mountains and beats back old Neptune himself. This art carries out the aims of the Creator as the benefactor of man. Within a century our own country has lived ten centuries; and these few millions have done the work of a hundred years; and a city like this achieves industrial results beyond those achieved by the empire of the Cæsars when theirs was the empire of the world. Surely the old fable is realized, and the dragon's teeth, if they do not create men, do the work of men. Who shall speak of the electric-newsman, compared with whom Ariel is very slow? These are the influences which are yet to bring the Atlantic and the Pacific into a proximity which shall render them like the Siamese Twins, feeling the beatings of each other's hearts. The politicians have said a great many things—some very good ones, and some very poor ones—about the saving the Union; but the mechanic has wired it and tied it together, so that all the politicians will find it difficult to take it apart."

It is not of the poetry but of the practical knowledge of mechanism we would speak. There is too much *dilettantism* already about mechanism, and we would rather speak of the *practice* than the poetry of it. And why? Because we find from the late Commissioner of Patents that of every five applications made at Washington for so-called improvements, two are only monuments of wasted time and ruinous enterprise, made by persons many of them quite deficient in a knowledge of the first

principles of mechanical science. We read that in the Museum of the Mechanics' Institute of Glasgow, there is preserved the model of a machine to procure perpetual motion. In the contrivance and execution of this beautiful machine an ingenious watchmaker spent seven years of his life! It is not, and never could be, of the least earthly use, and is only a lasting monument of the watchmaker's ignorance, perseverance, and handicraft. We might lengthen our illustrations of similar failures constantly transpiring in our midst, but enough has been said to show that all real advances in mechanism can only be proportional to the thorough acquaintance with first principles. Enough has been said to show that no great mechanical or scientific improvements, such as those of a Newton, a Hargreaves, or a Fulton, could ever have been made, without the mind being previously stored with scientific elementary knowledge. The falling of an apple may have suggested the law of gravitation to Newton; the motion of a common spinning-wheel continued while in a state of falling to the ground may have suggested to Hargreaves the invention of the cotton jenny; the steam issuing from the spout of a tea-kettle may to Watt have foreshadowed that mighty motor, steam! But it was to their well-digested elementary education the world owes their ability to turn these circumstances to good account.

Each month we shall illustrate the elements, as well as record the progress, of science and mechanism; for it is a universally admitted truth, that upon the diffusion of these two bases of genius and art will depend much of our nation's future welfare and prosperity. It shall be our monthly task as well as pleasure to give such lessons as shall render our industry characterized by our genius.

THE ARTS, AND THEIR COMMERCIAL AND MANUFACTURING UTILITY.—We have great faith in the effects to be expected from directing the attention of the producing public to the study of the truly beautiful in art and nature. We have a warm conviction that the higher the standard of excellence to which attention is directed, the more noble and beautiful will be the living result. For instance, besides the pleasure derived from the study of form and color, and the numerous resources which it opens up to the mind, it is directly calculated to influence in a particular degree the progress of our trade and manufactures. As the eye becomes familiarized with the beautiful, a

new sense seems to be created, to gratify whose cravings the stores of nature and the ingenuity of man are alike made subservient; and thus the more widely extended the knowledge of art, the greater becomes the demand for articles in which taste is combined with utility. It is precisely this want which designers and artisans are called on to supply; and as skilled labor is the best paid, and a great amount of American money is spent upon foreign ornate manufactures, so the whole country must benefit by home art-education.

It is in such belief we hail schools of design, and lectures upon the subject of Art, fully convinced that a vast improvement in mental action, in morals, and general activity for good would be the result. A well illustrated book is a picture gallery in miniature. It supplies to the intelligent mechanic, farmer, and tradesmen, copies of the richest gems of art at a rate reachable to all, and especially to him who has children to train, and who is anxious to raise true and beautiful images in their minds, and teach them to look from "nature up to nature's God."

Eugenio Latilla has been lecturing lately at the Hope Chapel, in this city, on the Fine Arts as practically applied to commerce and manufactures. He said that "men affected to despise Art as a theme not marketable, yet there is probably nothing in the whole range of merchandise yielding so fair a percentage as that which has risen from the art, for example, of designing. Taste is as much a marketable commodity as iron or wood. Take a lamp, a mantelpiece, a carpet, a musical instrument, a lady's dress, a shawl—these and a thousand other things belong to the industrial arts; and manufactures are lowered or increased in value, according as the design is good or bad. The reason few articles of furniture possess real beauty is found in the fact that no designer is employed upon it, or one not knowing a well-drawn pattern from a bad, or not knowing one style from another, so that when he makes a vase, Gothic, Doric, and Elizabethan are all mixed up in hopeless confusion. Hundreds of thousands of dollars are expended in perpetuating corrupt taste. The lecturer then directed the attention of his hearers to some of the furniture of past times and past nations, and came down to those of modern date. We have seen that the Assyrians possessed a knowledge of sculpture, but they were ignorant of anatomy, and unable to infuse into their statues those life-like representations of the Grecian warriors, the smiting, prancing, and instinct of life in their chargers.

"In Assyrian Art we have a dim attempt

at grandeur, but the want of anatomical knowledge did not allow the Assyrian sculptors to attain the power of giving man's likeness that the Greek sculptor could do. The Assyrians were skilled in the art of casting metals; they were also acquainted with the art of gilding. The Assyrians and Babylonians were noted for the weaving of cloth of various colors, and in this stuff gold was often woven in the threads. We learn from sacred and profane history their garments were of rare value. Plutarch informs us that Cato received as a legacy a Babylonish garment, but he sold it because it was too costly for a citizen to wear. The carpets of Babylon were extremely rich, embroidered with animals and flowers. The Persians are considered to have attained their knowledge from this source: the colors, though rich, are combined in the most perfect harmony. They present a striking contrast to some carpets I have seen here, which seem to have been made to dazzle the sight, but set all harmony at defiance."

The lecturer concluded by denouncing the folly of employing the cast-off frippery of European garrets, but to endeavor to employ our own vast resources of mind and matter in both the fine and industrial arts. In short, in this, as in all other departments, we must learn to think, and feel, and do for ourselves.

THE CALORIC ENGINE OF ERICSSON.—The present struggles for a new motive power are indicative of great results. The increased anxiety for the triumph of American Ocean Navigation keeps pace with the progression of wealth and power. When the *Great Western*, *British Queen*, and the *President*, had successfully overcome the most formidable obstacles to ocean steam navigation, Great Britain concluded she had secured her ancient dominion on the seas. But rich in experience, wealth, and wisdom, able in constructive skill and marine intrepidity as England is, she has only shown the way to her child-empire on this side the sea. Her empire is departed to more youthful and vigorous hands. The great desideratum has been achieved—a prime mover has at last been *practically tested*, applicable, energetic, and more economical than steam, and whose mechanism is less roomy, bulky, costly, and dangerous than the steam engine.

The Caloric ship Ericsson left her dock at the foot of North Eighth street, Williamsburg, on the 4th of January, at 9½ o'clock, A. M., passed the flag-staff on Governor's Island at 9 o'clock 56 minutes, and passed abreast of Fort Dimond at 10 o'clock 30½ minutes; thus making a distance of 7½

miles in 34½ minutes. She arrived at the buoy on the Southwest Spit at 11 o'clock 21 minutes; after rounding the buoy, owing to the boisterous weather, accompanied with a severe snowstorm, it was deemed prudent to come to anchor and remain during the night. On her way down and returning, the engine was not stopped or the speed slackened. Some alterations and improvements are yet to be made in her engines, and her engineers will make several excursions for the purpose of testing her qualities thoroughly before she proceeds on her grand trial trip to Philadelphia, Baltimore, and Charleston. The speed attained on this trip has far exceeded the anticipations of those interested, and also that claimed by the inventor, Capt. Ericsson. During Wednesday and the day before, after it was known that the Ericsson had finally proceeded down the Bay, there was much curiosity manifested, throughout this and the adjoining cities, to learn the final result of the experiment. Thousands of persons lined the piers to obtain a glimpse of the modern Flying Dutchman, propelled neither by wind nor steam, and all seemed to feel that she was the discovery of this half of the century. To Ericsson belongs the honor of practically conferring a benefit upon mankind no less important in its ultimate results than the first application of steam. We shall presently have to believe as much in flying air-ships as in the Telegraph, and perhaps in a few years the present magnificent engines and steam inventions will be curiosities equal to those of Fitch and Fulton's day, now. Such is the rapid progress of our country in Arts, Science, and Mechanics.

USES OF THE ATMOSPHERE.—The first terrestrial body that has always arrested attention is the atmosphere, which is so essentially necessary to the support of animal and vegetable life, and therefore a worthy object of investigation to every philosopher. This atmosphere is a thin, transparent fluid, surrounding the earth to a considerable height above its surface, and though generally regarded as invisible, is not so in reality. If we look at a distant object, such as a mountain, or village spire, when the atmosphere is clear, we shall perceive it of a bluish tint, and the intensity of this tint will vary with the distance of the object, growing fainter as we draw near to it, and *vice versa*. The boundless vault of heaven appears also of an azure blue color, which results not from the sun, moon or stars, but from the mass of atmospheric air through which those bodies are seen. The finely attenuated and almost spiritual condition of the atmosphere prevents us

from seeing its hue, unless we look through a large mass of it, until the recent discovery by which it can be seen distinctly. The *uses* of the atmosphere are many. It serves, for example, to equalize the distribution of heat over the surface of the earth. Expanding, and of course becoming specifically lighter from increase of temperature, a current of air always ascends from any part of the earth's surface that is much exposed to the solar rays; it carries off the excess of heat, which would otherwise accumulate, while its place is supplied by colder air, which is pressed in on every side. The warmer air is wafted to colder regions, and parts, in its progress, with the heat it had received. A circulation is thus established, by which the extremes of heat and cold, that would otherwise have rendered the greater part of the globe uninhabitable, are prevented; while by these motions of the air, its purity as adapted to the support of animals is more effectually preserved. It is the useful agent by which the circulation of water is established. Assisted by heat, it is capable of elevating a portion of this fluid in vapor, which, cooled in the higher regions, or in cooler climates, descends in the form of dew, rain or snow; and by the declivity of the land is conveyed over its surface, and returns to sea. Lastly, air is indispensable to the support of vegetables.

CLOVER THRESHER.—Sandford Mason and Seth M. Eastman, of Millport, N. Y., have invented a machine to obviate the inconvenience at present felt of threshing clover and small seed. It consists in employing a cylinder with teeth on its periphery, and two additional sets of teeth, one above fixed to the frame, and the other below on a fast bed. The former are used for threshing the straw, while the latter act as a rasp, by which the seed are cleaned from the heads.

STRAW CUTTER.—Measures have been taken by David and Lyman Clinton, of North Haven, Ct., to patent a straw cutter cylinder. The advantage is said to consist in attaching a wrought-iron shaft to the cast-iron cylinder holding the cutters; and this latter may be either cast around the former or cast separate from it, and then secured by pins. The cylinder of this invention will be more durable than those shafts cast by the ordinary method, as they often break at the points where the knives are attached to the flanges.

MINERAL MATTER ASSIMILATED IN VARIOUS CROPS.—It is found on analysis that an acre of wheat being an average crop, carries off with it no less than 210 pounds of inorganic elements, viz: 30 pounds in the

grain, and 180 pounds in the straw—a striking proof of the importance of consuming the straw upon the land. Barley takes off 213 pounds—53 in the grain, and 160 in the straw. Oats take 316 pounds—32 in grain, 30 in the husks, 54 in the chaff, and 200 in the straw. A crop of turnips,

of twenty tons per acre, when removed off the land, carries off 650 pounds of mineral matter. Potatoes, including the tops, take off 580 pounds, the tops containing about 400 pounds. Cabbage carries off nearly 1,000 pounds.

List of Patents Issued during January, 1853.

Daniel S. Bayles, Brooklyn, N. Y.—Improved parrel for yards and vessels.

M. A. Bertolet, L. Kirk, and A. M. De Hart, of Reading, Pa.—Improvements in the method of obtaining gold, &c. by amalgamation.

Samuel Canby, Ellicott's Mills, Md.—Improvement in winnowing machines.

George Daure, Pascal Nicholas, and Felix Lopez; Marseilles, France.—Improved process of making illuminated gas.

Elihu and Warren W. Dutcher, North Bennington, Vt.—Improved temples for looms.

John P. Farnham, assignor to J. Jenkins and, C. B. Clark, of Andover, Mass.—Improvement in cutting paper.

Pierce Saulnier, assignor to J. T. Bruen, of New-York city.—Improved mode of mounting the cutters of machines for planing metals.

Royal E. House, New-York city.—Improvement in Magnetic Printing Telegraph.

Edward Page, Albany, N. Y.—Machinery for heading bolts, &c.

Wm. Tucker, Blackstone, Mass.—Improvement in shuttles for looms.

Wm. E. Ward, Portchester, N. Y.—Improved method of heading screw blanks, rivets, &c.

Henry Waterman, Williamsburg, N. Y.—Improvement in safety apparatus for steam boilers.

John F. Winslow and John Synder, Troy, N. Y.—Machinery for making railroad chairs.

Wm. Garnall, Newark, Ohio.—Improvement in daguerreotyping.

James P. Arnold, Louisville, Ky.—Improvement in machines for heckling flax and hemp.

John I. Bruen, and James G. Wilson, Hastings, N. Y.—Improvement in machines for sawing stone.

James G. Clark, Philadelphia, Pa.—Improvement in self-winding telegraphic registers.

George Feaga and George W. Feaga, Frederick, Md.—Improvement in grain-washers.

John S. Gallaher, Jr., Washington, D. C.—Improvement in crutches.

John C. Bidwell and John Hall, of Pittsburg, Pa., executors of Samuel Hall, deceased.—Improvement in hillside ploughs.

Richard Hollings, Boston, Mass.—Improvement in hose-pipes.

Benjamin T. Jenkins and Luke L. Knight, Barre, Mass.—Improvement in lathes for turning irregular forms.

Merritt Peckham and Lucius O. Palmer, Utica, N. Y.—Improvements in ore-washers.

Francis C. Schaffer, Brooklyn, N. Y.—Improvement in potato diggers.

William Watson, Chicago, Ill.—Improvement in tonguing and grooving machines.

Jephtha A. Wilkinson, Piteplace, N. Y.—Improvement in printing presses. Dated January 4, 1853. Patented in England, September 23, 1842.

Thomas Baylis and Daniel Williams, Tecumseh, Mich.—Improvement in rakes to harvesters.

Rudolph Kreeter, New-York, N. Y., assignor to Robert Nunas and John Clark of same place.—Improvement in covering pianoforte hammers.

Walter Hunt, New-York, N. Y., assignor to Charles T. Kipp, of same place.—Improvement in bottle-stoppers.

Matthew Chapman, of New-York, N. Y.—Improvement in lathes for turning interior and exterior surfaces.

Moses G. Farmer, Saleff, Mass.—Improvement in porous cells for galvanic batteries.

Pinckney Frost, Springfield, Vt.—Improvement in scythe fastenings.

Ammi M. George, Nashua, N. H.—Improvement in mode of operating circular saws.

John L. Gilliland, Brooklyn, N. Y.—Improvement in fire-polishing glass.

Peter P. R. Hayden, New-York, N. Y.—Improvement in buckles.

Silas A. Hedges, Lancaster, Ohio.—Improvement in manure-spreaders.

Wm. Mann, Philadelphia, Penn.—Improvement in manufacturing copying paper.

Andrew Mayer, Philadelphia, Penn.—Improvement in screw cutting dies.

Richard Montgomery, New-York, N. Y.—Improved method of connecting the sheets of shute flue and water-space steam boilers.

Daniel Pease, Jr., of Floyd, N. Y.—Improvement in smut machines.

Robert W. Andrews, Stafford, Conn.—Improvement in operating the treddles of looms.

Chas. L. Bander, Cleveland, O.—Improved bedstead fastenings.

Dexter H. Chamberlain, Boston, Mass., assignor to Cyrus G. Howard, of same place.—Improvements in machinery for reducing metal bars.

Joseph Coutner, Milroy, Pa.—Improved saddle-trees.

Geo. and David Cook, New-Haven, Conn.—Improvement in driving circular saws.

Ed. Everett, Lawrence, Mass., and Samuel T. Thomas, Lowell, Mass.—Improvement in harness boards for Jacquard looms.

James S. Hogeland, Lafayette, Ind.—Improved wool condensers.

Jno. Griffiths, Philadelphia, Pa.—Improvement in screw-cutting dies.

Jno. L. Kingsley, New-York city.—Improvement in compounds for stereotype plates.

Jeremiah P. Smith, Hummelstown, Pa.—Improvement in corn-shellers.

Jos. W. Webb, Aurora, N. Y., assignor to Benj. Gould.—Improvement in valves of rotary steam engines.

Sam. and Wm. H. Witherow, assignor to Sam. Witherow, Gettysburg, Pa.—Improvement in seed planters.

DESIGN.—Robert E. Dietz, New-York, N. Y.—Design for a girandole.

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THE WESTCHESTER GAZETTE,

Edited by HENRY SPRATLEY,

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WILDER'S PATENT SALAMANDERS, WITH RICH'S IMPROVEMENT.

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COMBINED, ARE MADE BY

146 Water St.,



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STEARNS & MARVIN,

New-York.

The sole Proprietors of Rich's Patent with

tent, and joint Proprietors of Wild-
Silas C. Herring.

THE GREAT FIRE IN CHILLICOTHE, ONE THIRD THE TOWN BURN'T TO ASHES!

CHILLICOTHE, OHIO, Tuesday, April 13th, 1852.

MESSRS. STEARNS & MARVIN—Gentlemen: Yours of the 5th is at hand. In reply, every Safe in the fire, except yours, has proved good for nothing. I lost a large Safe—it was perfectly destroyed; but in the small Salamander I bought from you, nothing was injured.

Your obedient Servant, **W. T. CLEMONS.**

The above letter shows that in a real hot fire Rich's SALAMANDERS are the only Safes to be depended upon. In the Pearl street fire, eleven Safes, of different makers, were totally destroyed, Rich's Safe alone bidding defiance to the flames, preserving notes, bonds, and mortgages, to the value of \$100,000. The Chillicothe fire is a parallel case—every Safe but Rich's is destroyed. These repeated occurrences prove incontrovertibly that Wilder's Patent Salamander, with Rich's improvement, are the best Safes made in the United States, or in

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